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THE MONTH.

NO expedition that has yet attempted to solve the mysteries of the Arctic regions has equaled, in point of preparation and equipment, that which left England last month. Everything that science or experience could suggest has been done to make it a success. The vessels chosen for the voyage are well adapted for their work: all the officers and many of the men have been tried in the rough experiences of the Arctic life, and the prospect of success is fairer than that which has attended the departure of any of the expeditions which have made up the history of exploration in the North. The intention of Captain Nares is to push as far north as possible this year, and establish his winter quarters in some well chosen spot. In March he will start northward on sledges, with the hope of reaching the Pole and returning by the following September; but the plans of the expedition include the possibility of its remaining through a second winter. These calculations are based upon the theory that the open Polar Sea of Dr. Kane does not exist, but it is this uncertainty that doubtless renders such an undertaking attractive. There was something pathetic in the desperate illness of Lady Franklin at the moment of the expedition's departure. She has partially recovered, and it may devoutly be wished that she shall live to see its safe return after a successful exploration of those mysterious regions with which her name must

be forever honorably associated. Few fields remain now for the spirit of adventure; Asia, America and the heart of Africa have no longer any secrets; and if this expedition, so well equipped and so systematically planned, shall at last unlock the regions of the Pole, the would-be explorer of the future will have nothing to do but weep in vain for other worlds.

THE question of a Royal residence in Ireland has been again mooted, and this time in a more direct and practical way. But after a short discussion in the House of Commons, it received a quietus, for the time at least, at the hands of Mr. Disraeli, who requested the mover to withdraw the proposition, on the ground that the matter should be left to the free will and inclination of Her Majesty. The Queen, however, is not likely at her age to do anything about it. She comes into London but once or twice a year, and then only for a day, and never allows either the business of the State or the claims of country or hospitality to interfere with her journeys to Balmoral. That she will take so troublesome a step as would be to her the purchase and arrangement of a country seat in Ireland, with any idea of occupying it, simply from motives of policy, can hardly be expected; and she is much less likely to incur the expense without the advantage. The great can always purchase popularity at the cheapest price; and it is so easy for a person in the Queen's position to make herself beloved that one may wonder that she does not do so. The Irish would undoubtedly have welcomed the Royal family to a home among them with loyal enthusiasm, but the matter has now been so much and so freely discussed that as a question of policy the time for it seems to have gone by.

THE American Riflemen have done extremely well. Their victory was fairly and honorably won, and the good sense they have shown in letting nothing tempt them to imperil the glory of it is certainly commendable. What an Irish rifleman has written of them is doubtless true—there are many individual shots who can do as well as they, but in point of discipline and spirit they are unequaled, and as a team could not be beaten by any that the United Kingdom could produce. Col. Gildersleeve took occasion the other day (at one of the innumerable banquets which

have been given to the Americans) to disabuse the minds of his hearers of the idea that America is a nation of riflemen. An Irish paper has attributed the success of the strangers to the fact that the team was picked out of 40,000,000 of men accustomed from boyhood to handle the rifle, while the Irish was taken from 5,000,000, of whom but few are familiar with the weapon. Indeed, the number of Englishmen who imagine that the ordinary American goes about with a bowie-knife in his boot, a revolver in his belt, in one hand a whisky cock-tail and in the other his "trusty rifle," is by no means small. To those who suppose it to be the daily practice of the American youth in his moments of relaxation, as he wanders up and down Broadway or Chestnut street, to stop every now and then, and then with unerring aim knock off the heads of the squirrels as they sport upon the forest trees that line those rural avenues, the skill of the American team would seem a matter of course. The truth is, however, that in shooting, as in most other sports, the Englishmen who become experts outnumber us five to one. The proportion of Americans in the Eastern States who are accustomed to the rifle or the shot-gun is infinitely less than those of the same class of Englishmen. Shooting has never been the fashion here as it has always been in England, and the success of Gildersleeve and his friends is in no way due to any national habit or characteristic. It is simply the logical result of careful practice and strict discipline, which has bred proficiency in a manly sport in which few of us take an active interest, and far less excel.

THE Sultan of Zanzibar was not very cordially received at the outset, but he has now become the fashion. He is described as a handsome man, of fair intelligence, and the impression that he has made is far more favorable to him personally than that produced by the Shah. The old world and the new—the East and West—are not only brought face to face now-a-days; they are made to shake hands and embrace. Certainly the visits to the capitals of Europe of the Sultan, the Shah, and this potentate of Zanzibar, will bear useful fruit in times to come. It is always the first step which costs; while little influence may be exerted on those individuals personally, their visits have made future ones possible, while the educating influence of such experiences on the minds of

those about them, cannot be exaggerated. Familiarity breeds mutual regard and understanding as often as contempt, and more of it among the nations will do far greater service in preventing war than all the murderous inventions on the one hand, or Peace Societies on the other, that ever were invented by ingenious and ingenuous man.

THE floods in France have done unprecedented injury. Hundreds of lives have been lost and millions of property destroyed. The President has been to the scene of disaster, the Government is doing all in its power, and the newspapers teem with accounts of the destruction and with appeals for succor for the suffering. There seems to be no way of arresting such calamities as these. The rivers in the south of France are generally as well-behaved as any in the world, and no wisdom or foresight can prepare for such an unexpected and unprecedented flood. The destruction of property is in most cases complete, and the utter loss of so much capital must be felt even at a distance. The telegraph reports that the number of lives lost amounts to more than a thousand, that in Toulouse alone eight hundred houses have fallen and twenty thousand people are without the means of subsistence. The rains which have produced these calamities were not confined to France, for at Buda and Pesth the rising Danube has also done immense injury to property, and also occasioned loss of life. The share of rain which belongs here has evidently this spring been falling on the wrong side of the Atlantic.

THE bulletins from Spain are generally meagre, and this month they form no exception to that rule. It appears from them, however, that General Jovellar has gained a substantial advantage and the Carlists under Dorregaray are reported in full retreat. Fortune has been more fickle than ever during this civil war in Spain, and the next telegram may bring us the reverse of all this. Indeed, there is no limit in point of time to a war of this irregular and guerilla kind. Don Carlos has great strength with the majority of the inhabitants in certain of the provinces, and while the prospect of overthrowing Alfonso and capturing Madrid has at no time been favorable, he can readily keep up the evils, if he can gain none of the advantages of war. The reactionary and des-

potic behavior of Alfonso's government have deprived him of the sympathy of liberal-minded Europe; and if the majority wish him success against his cousin, it is not because they love him more but Don Carlos less. Between two such millstones unfortunate Spain is likely to be ground for some time to come. It is a pity that they cannot be put about the necks of Bigotry and Intolerance, and cast with them into the sea.

We are now fairly in the Centennial period. Beginning with the celebration of the meeting of the First Congress last September, we have now commemorated the battles of Lexington and Concord and Bunker Hill, the capture of Ticonderoga, and the formal taking of command of the Army by Washington under the Cambridge Elm. In some respects the celebration of the one hundredth anniversary of Bunker Hill was a great success. The intellectual and literary part was perhaps not worthy of the occasion. Judge Davis's oration was not a great oration, but it was interesting and well delivered. The occasion was one which a genius might have improved to advantage, but nothing short of genius could have composed an oration worthy to be called great on a theme on which Webster and Everett have done their best. A mortal without wings could hardly have climbed higher than such heads as theirs, and Judge Davis did not attempt it. But the celebration was remarkable for the opportunity it gave, which was so well improved, of showing hospitality and welcome to the South. A few days like the 17th of June will do more to destroy the passions of the Rebellion and put out its smouldering ashes, than all the Force Bills that could be drafted, backed by a thousand Sheridans. It has often been said that the South would have never seceded had it known the North, and it is true that there is no pacificator like friendship and mutual regard. The Southern men who visited Boston on the 17th of June will go home the Evangelists of a Gospel of Re-Union and Peace, and even now their influence can be felt. Of course the matter may be a little overdone. The enthusiasm of the Bostonians was heightened by the nervous desire to impress their hearty welcome on their once rebellious brethren, and on both sides there was a little unnecessary, but entirely natural, "gush." But when this shall have given way to a more sober and steady feeling, we shall

all have occasion to be thankful that the opportunity came and was so well made use of.

THE legal profession of Philadelphia has been deprived of an old and sterling member by the death of the late George M. Stroud. He had attained with unusual physical vigor and with clear mental faculties his eighty-first year, and he was cut down by over-exertion in finding out a sick woman who was anxious to get into the Episcopal Hospital. The charitable office that proved the immediate cause of his death was the last ornament of a long life spent more in relieving the necessities of others than in maturing plans for his own advancement. His memory has enough willing witnesses of his private life, and it is the purpose of this short note to consider only the last public act of his career.

Judge Stroud came to the bench by appointment and remained upon it by election through a term of thirty-five years. The last words he uttered from the bench were to the bar meeting held on the occasion of his retirement. And they were principally words of warning and advice as to the danger of the election of the judiciary, and the necessity of returning to the system of appointment. And this was a subject which those who knew his sensitiveness felt he would not, as one of the last judges by appointment, have touched upon except from the profoundest conviction of duty. His long experience, faithful service and great age, gave to his remarks on that occasion almost the weight and solemnity of dying declarations. And the bar must feel now that soon no man like him will be able to attain judicial honors. We say soon, because the office is new on the tickets, and, if such a thing can be, somewhat sacred to the party leaders. When they have become shameless through handling it, no man, it is safe to predict, will be made a judge who is not a hand-shaker of the strikers and beholden to the repeaters. We may presume that men sensitive of honor will not compete in the race of diligence for the bench. And this change in our political system was finally confirmed by the new constitution, which took away all the powers worth having from a corrupted legislature and conferred them upon an incorruptible judiciary. These words would be lacking in respect for the dead if they were not written sincerely of our present courts, every member of

which has deserved and earned the confidence of the bar. But do these gentlemen feel differently from Judge Stroud, who himself received his last appointment from the people?

THE jury in the Beecher trial were too good a representation of the whole community to be able to reach any satisfactory conclusion. While the popular faith in the method of jury procedure as a means of reaching the truth is by no means lively at present, there was a disposition to look to the verdict as at least a formal solution of an insoluble puzzle, which would enable people to regard the whole thing as disposed of. But the jury have not given us this much of satisfaction, and we do not even certainly know to which side the majority inclined.

We hope that the whole of this unsavory business is now to be decently buried and forgotten. It has poisoned the air long enough, in all conscience. Anybody concerned in the case that feels satisfied with the part he has played, will not be begrudged that sensation. As to the chief actor in the case, while we are by no means convinced of his guilt, we must feel, after the disclosures made on the trial, that he is not the man that the American people took him to be. On his own showing, his ideals of life and duty are dreadfully lacking in many essential ethical elements His conceptions of Christian character are not those that we expected in so eminent a popular teacher.

The most important question, perhaps, is the relation of the popular mind to the whole scandal, and we think that in this regard the condition of affairs is quite satisfactory. Sixty years ago, if such a charge had been brought against a prominent minister, all the interests he was supposed to represent would have received corresponding damage. The disposition to assume not only the truth of such charges, but also that the facts were but fair specimens of the intercourse of the clerical class with the rest of mankind, was far stronger than at present. It was about 1818 that the tide turned, and that the then waning influence of the Christian churches began to gain that comparative ascendency which they now possess in American society. No scandal against this or that individual member has the least power to shake in the public esteem the great mass of their order and the interests it represents.

THE Commencement season has been unusually prolific of noticeable talk. Gov. Chamberlain of South Carolina, President Woolsey of Yale, and the Hon. Charles Francis Adams, have delivered orations within the month which have attracted attention. It is a healthy sign of the thought of the times when men of authority, in their counsels to the young, dwell upon politics and subjects of a kindred nature. There are no dangers greater than those which flow from the apathy of the better educated and more intelligent classes of this country and their want of interest in public affairs, and when the danger is so strongly dwelt upon, there may be hope of improvement and change. In Yale College a department of political study has been established within a few years, and particular stress is laid upon the duty of the educated citizen in a free State to take part in politics. The discussion of these topics on the platform and in the public journals must produce good results, and is a very encouraging feature of the times. Mr. Adams in his address at Amherst points out the value of the orator under free institutions like ours, and combats the too prevalent idea that oratory has ceased to be a useful art. President Woolsey thinks that the true cure for the political evils of the day lies in the elevation and purification of the individual man, and both he and Mr. Adams urge upon their hearers the duty of becoming active politicians. A curious contrast to the healthy tone and true philosophy of these orations may be found in the speech delivered recently at the University of Virginia, by a Colonel Preston, and in a letter of a Mr. Hilliard, of Georgia or Alabama. The speech reads like the giving out of some fire-eater of the years between '58 and '61, and seems to have been mislaid and turned up after all these years by mistake. It is an anachronism. It devotes space and much flowery rhetoric to proving that the passengers in the ships that landed at Jamestown were high-toned, chivalric gentlemen, with a philanthropic turn of mind, while the cargo of the Mayflower was made up of the scourings of English prisons—of curs and creatures of low degree. The moral which Mr. Preston draws is plain, and he enforces it with an abundance of sulphurous, flaming rhetoric. Mr. Hilliard's letter is pitched in a different key. He bewails the loss of his liberty and things, and declines to take part in the 4th of July celebration, because, poor man, he has nothing to celebrate. He, too, belongs to

another epoch than the present, and is, perhaps, unfit for the future. Like Admiral Semmes, he glories in the name of Irreconcilable. But the time for such sentiments as these has long gone by, and they can do no further harm either to North or South. The Southern people are too sensible not to accept the inevitable and logical results of their own acts, and in many ways they are showing their acquiescence in them. The "nurslings" of Virginia, as Mr. Preston called his hearers, have been taught in a different school, or at least have learned the lesson which he could not; and the protests which come from all parts of the late Confederacy against such sentiments as he has given utterance to, show that the long-suffering people are no longer willing to be held responsible for the intemperate talk of a few mad-caps who live among them.

THE University of Pennsylvania, after about a hundred years of what we might call adversity, is promising to regain the eminent position she occupied in colonial times. After various changes in the enlargement of the courses of study, and the securing of new and convenient buildings, and the establishment of a school of science, the age of endowments has begun for her. The gifts of Messrs. Whitney and Williamson we have already chronicled; and we are now glad to add that our late fellow citizen, Mr. Towne, has made the University his residuary legatee, with the proviso that the money thus realized be expended in paying the salaries of professors and instructors in the new Department of Science. What the University will receive after all settlements are made and various life interests expire is variously estimated even by those who are best informed; some put the sum as high as a million dollars. This is the largest single gift to the cause of scientific education ever made in America, and has been very properly acknowledged in the change of the style of the Department to that of the Towne Scientific School. Especially wise is the proviso which transfers this new endowment to the general endowment fund, instead of laying down petty conditions as to its expenditure on this or that chair. As all experience shows, special endowments make colleges and universities permanently poor, as they raise expectations which can only be fulfilled by outlays of other moneys which are much needed in other directions.

It has been suggested, and we give the suggestion for what it is worth, that an appropriate way of acknowledging Mr. Towne's munificence would be some arrangement to connect the School which bears his name with the public schools of the city, by admitting every year a certain number of the best prepared graduates of the grammar schools, either at reduced rates of payment or gratuitously. This arrangement need not be in any way offensive to those who are benefited by it; all our colleges and universities are public charities, in which the cost of the education given far exceeds the fees received from the student; it is merely a question of less or more. The outlay of any of the city's income in paying even reduced fees would, of course, be opposed as inconsistent with the maintenance of the High School. The feasibility of the plan is necessarily a matter for the decision of those who control the finances of the University, as nobody outside their number is competent to say what can or cannot be done in the matter.

Following close upon Mr. Towne, Mr. Wall Flower leaves the University an estate estimated, after all deductions, as worth some $200,000 for the establishment of an observatory; and unless the heirs-at-law succeed in their threatened attempt to break the will, a very necessary part of the outfit of the institution will be at last supplied. Yet, large as the sum is, it will not be enough to build, equip and man an observatory after the style of those that exist in Europe. An observatory is not chiefly a building and instruments; it is a staff of competent observers, and the smallest number that a first class institution can get on with is six—two principals, each supported by two assistants, to relieve each other. That some American college observatories—that of the Western University of Pennsylvania in Alleghany for instance, and that of Hamilton College—have done fair service without such a staff, is true enough, just as various other wonders have been effected by very persevering men in spite of great obstacles. But the object of the endowment of research is to remove obstacles, not to set men to see how far they can be overcome by unaided strength.

Two other departments of the University are about to undergo new development. The Law Department at last takes its true place in our city—corresponding to that so long and prosperously held by that of Columbia College in New York city—through the decision of our courts to accept its diploma as sufficient evidence

that the candidate for the bar has gone through a satisfactory course of study. In the Medical Department the graded system of study, long pleaded for by our national medical societies, and already adopted at Harvard College, is now to be introduced. As this transition involves a probable temporary diminution in the receipts from students, it involves a change in the relation of the department to the Board of Trustees, who will hereafter control its finances, fix and pay salaries, and be responsible for deficiencies. The immediate deficiency is to be met by a subscription, towards which Mr. J. Gillingham Fell has generously subscribed $5,000 for three years.

OHIO is now the battle-ground. Governor Allen is supposed to be a Jackson Democrat, one of the hardest of the hard-money school; but the only plank in the platform on which he has to stand, which is of any general interest, is one which represents the opposite theory. It may be doubted, perhaps, whether it was the intention of those who forced the inflation plank through the convention to make it so important and significant a feature of the canvass, but it turns out to be the point on which everything turns. Judge Kelley has gone out to Ohio to enlighten his fellow citizens on the subject of his intro-convertible-elastic-self-adjusting bonds, and Republican though he be, will make a speech directly in favor of the Democratic side of the argument. General Butler too has announced his intention to take part in the contest, and on the same side, because he regards the money question involved as of more importance than all others, and in this last view he is right. The situation is extremely interesting. By the change of her time of voting, Pennsylvania has ceased to be the important State, and Ohio stands alone. Both parties will necessarily make every effort to carry the election, and the result will directly affect the Presidential contest of next year. The action of the Democrats in making themselves the champions of the paper money party gives the Republicans another excellent chance, and illustrates the extraordinary luck of that party in its decline. It has now the opportunity of rallying to itself all the Independents and Liberals, who are chiefly hard-money men, and even a large number of Democrats who regard the currency question as the great issue of the times, and this late action of the party in Ohio as a

fatal and even a wicked blunder. Hitherto the parties have been fairly enough divided, Tilden, Bayard, Thurman and Hendricks standing beside Blaine, Conkling and Dawes—Gordon, Pendleton, Merriman and McCreery striking hands with Logan, Morton and Butler. The Republicans have been nearly as much identified with Mr. Pendleton's views as the Democrats with Mr. Kelley's, but the present move of the Democrats in Ohio gives their opponents a chance to seize and occupy for their own the stronger ground. Unfortunately, they will wait until the Ohio election has proved the strength or weakness of the inflation theory. This is not good strategy; it is not even good politics. It may be the shrewdness of the politician who seeks for votes on any platform; it is not the wisdom of the statesman who wishes for the right to win.

CONSCIOUSNESS IN EVOLUTION.[1]

I. PRELIMINARY.

THE evidence of what is termed "design" in the structure of beings exhibiting life, is often appealed to by one class of thinkers, as proving the intervention of a personal Deity in the creation of such; and the same feature exhibited in the movements of living creatures is regarded by metaphysicians of a similar class, as an indication of their possession of a power of choice, or "free agency," at least in the case of man. The opposing school, of whom Professor Bain may be selected as an example, believes that designed acts are without an element of freedom, but are simply performed in obedience to stimuli of various kinds, motion following stimulus as inevitably as effect succeeds cause in the non-living world. The evolutionists attempt to explain design in structure, through the operation of the Darwinian law of the "survival of the fittest," showing that only those beings whose organization displays that adaptation to use in relation to its surroundings, which is termed "design,"

[1] A lecture delivered before the Franklin Institute, Philadelphia, February, 1874.

could possibly continue to exist. It is justly urged against this reasoning, that it attempts no explanation of the *origin* of such structures. Another school of evolutionists have therefore maintained that such structures are due to the effect of effort, *i. e.* stimulus or use, exerted by the living being on its own body, and that the design thus displayed, is an expression of the intelligence at some time possessed by itself.

So long as there is any probability of the last explanation proving valid, it will be important to examine into the questions of metaphysics which it necessarily involves. The investigation is indeed but the necessary projection of those which have resulted in satisfying the great majority of biologists of the reality of evolution, or of the fact of the descent of existing living beings, species by species, order by order, and class by class, from others which have preceded them in time. Clearly, then, we enter the question by considering the nature of movements of plants and animals in relation to the stimuli which are supposed to call them forth.

2. THE UNCONSCIOUS.

A true study of metaphysics necessarily has for its objects plants, animals, idiots and infants, as well as healthy men; nevertheless, necessity compels us, in discussing the question, to dwell on our own experiences as a *sine qua non*. Now experience, in a general sense, includes not only the memory of our conscious acts, but a knowledge of our unconscious ones, and to the latter especial attention must be directed, since they are most readily overlooked. The marvelous character of memory cannot be too much considered. Of the millions of impressions which the mind has received and registered, in the course of a lifetime, but one can be clearly present in consciousness at one time. The remaining millions are not lost; they are stored, each in its appropriate place, to be sprung into consciousness when the appropriate suggestion presents. How much more vast, from this point of view, is the unconscious mind than the conscious! But the phenomenon is not confined to memory. Who that has ever attempted the digestion of a subject which includes a mass of details, is not acquainted with the unconscious activity of the mind in classification? How frequeutly a question involving

many parts, is, on the first reception of the constituent facts, all confusion; but in time displays its symmetry clearly to the consciousness, every part in its proper place, and that with little or no further attention having been devoted to it. It is indeed probable that the every-day process of inductive reasoning is conducted in unconsciousness on the part of the subject. Induction consists in the generalization of some quality as common to a great number of objects of memory; a greater or smaller number of other qualities being neglected in the process. When this act is performed voluntarily, one or many qualities are successively passed in review before the mind, each one being in its turn impressed on the perceptive centres—so long as it is the object of inquiry, the others being excluded from consciousness for the time being. It is simply a process of classification, and when performed in consciousness, constitutes "experiment." But when no generality is anticipated and its existence is unknown, it often happens that such generalization becomes known or rises into consciousness, without the bestowal of effort in classification of the objects to which it refers. The impressions consciously received have been arranged out of consciousness, and when revived into consciousness display an order which was not previously known to exist. It is in the latter way that the "practical man" "finds out" the rules by which, as by an instinct, he regulates his intercourse with the world. He often cannot explain the reasons of their truth, nor does he know how he came by them, being generally content to call them the results of "experience." In some persons they are so feebly expressed in consciousness as to be called "feelings;" and many experiences or repititions are sometimes necessary to impress on us the importance of these mental products before we are willing to follow them in action. "Strength of mind" is an expression applied to a high degree of this unconscious reasoning; expressing the extent of ground the process covers continuously, as well as the exactitude of its results. The experimental investigator, on the other hand, performs this work deliberately, and is acquainted with the processes; he is, therefore, at first more confident of his results. And we observe here in passing, that a rule once discovered, is as readily retained in the cells of the unconscious, as is the memory of a simple object or event.

Another form of unconscious cerebration is seen in deductive reasoning, which employs rules already discovered in application to new cases. Calculating prodigies are a case in point. It is well known that those persons who have from time to time appeared, possessed of the power of calculating with enormous numbers with marvelous rapidity, have never been able to explain the process by which they reach their conclusion, nor are they conscious of going through the steps involved in the calculation they perform; and it has been said that great calculators have rarely been great mathematicians.

The explanation of these phenomena is not far to seek. In simpler forms it is presented to us every day. Thus it is an easy matter to read with but little consciousness of the process, and no recollection of the subject matter of what is read. Most manual operations can be performed while the consciousness is occupied with other objects.

If these be facts of human experience, how much more likely are they to be true of animals? If man be unconscious of the process during the performance of some of his most complex acts, how much more probable is it that animals are so while pursuing the narrower circle of their simpler ones? Yet animals are not devoid of consciousness; indeed, it is scarcely credible that any one should deny to them consciousness, after experience in their education.

But let these automatic acts be ever so simple or complex, it is claimed that they could not have *originated* out of consciousness. Whatever we call voluntary acts in ourselves, undoubtedly have to be *learned*. The acquisition of the primary act of walking is accomplished by a slow and painful education; while knitting and other manual exercises necessarily require preliminary training, some of shorter, others of longer, duration. This is true of such voluntary acts as we perform most readily automatically, and such as might be supposed to be most probably acquired by hereditary transmission, as for instance speaking. The case is the same with animals. All those services which are useful to us, or tricks which amuse us, are acquired at the expense of training, which involves a system of stimuli, consisting of rewards and punishments, as in our own species. Is there any reason to sup-

pose that those habits which we observe them to possess in a state of nature have had a different origin?

It is incontrovertible that a regular succession of muscular movements may be committed to memory as certainly as a color or a shape, and that a change of brain substance, such as causes the retention of the simple impression, is also involved in the retention of the complex. When this machinery is completed, through the repetition of conscious stimulus, it works thenceforth without necessary intervention of consciousness. The consciousnesss may then be engaged in fresh acquisitions, accomplishing new organizations, thus accumulating a store of powers. Once organized, these powers are at the disposal of their possessor, yet the organized machine will at some time undergo change, if not more or less frequently used. Without use it may indeed finally disappear, showing that the capacity for organization is identical with a facility of disorganization.

3. THE ORIGIN OF AUTOMATIC MOVEMENTS.

Is any habit originated in unconsciousness? Those who affirm this proposition, point to the movements of plants in the extension of their tendrils, and the closing of some sensitive leaves; the timely expansion of the down of the *Aesclepias* seed, and the insect-catching habits of *Drosera* and *Dionaea*. No one surely attributes consciousness to these. And there are many similar movements in animals which are as thoroughly unconsciously performed as are those of plants, from the first moment of the animal's birth; as for instance, the involuntary activities of the circulatory and digestive systems, etc. Did these originate in consciousness or unconsciousness? The answer to this question constitutes the key to the mysteries of evolution, and around it the battle of the evolutionists of the coming years will be fought.

It may be asserted at the outset that those habits whose origin we have had the opportunity of observing in ourselves and in other animals, were certainly acquired in consciousness, and that we do not believe that they could have originated out of it. The stimuli to action are divided into the two general classes of pleasures and pains, and each stimulus is potent in proportion to the intensity with which it is consciously apprehended. If many and complex acts may be performed automatically, through the organization of special machinery in the gray matter of the brain,

it is altogether reasonable that similar powers should be found to be conferred on gray nervous tissues in parts of the body which are no longer seats of consciousness. It is well known that the spinal cord of the headless frog responds to stimuli in the vigorous muscular contractions of the limbs which follow the application of acid to the skin. So the ganglionic centres of organic-life respond to their appropriate excitants; the various glands of the digestive system discharging their contents into the ingesta at the proper moment, consciousness having no share in the proceeding. These phenomena are more readily explained on the theory of endowment, than on that of physical movements; since by means of the former the evident design in the movements is accounted for, while the latter gives us no clue to this characteristic feature of these and all other vital processes.

The lowest form of consciousness is common sensibility; and judging by the resemblance between our own experience and that of the higher animals, the lowest of animals also are not devoid of this quality. The structureless jelly of Rhizopods, such as Amoebas, Gromias, etc., evidently selects its food with regard to its nutritious qualities, in most instances preferring diatoms and desmids to sand and other innutritious substances. Its acquisitions in knowledge of articles of food can only be accounted for on the hypothesis of original, pleasurable or painful, consciousness of the effects of external and internal contact with these substances, and retention of the impression in unconsciousness. The impression reviving on the recurring of a similar contact, the substance is accepted or rejected as the former sensations were pleasurable or painful. And this is not incredible, if, as the researches indicate, the structure of the protoplasm of these creatures is of the same type as that of the bioplastic bodies of the gray tissue of the brain.

In accordance with this view, the automatic "involuntary" movements of the heart, intestines, reproductive systems, etc., were organized in successve states of consciousness, which conferred rhythmic movements, whose results varied with the machinery already existing and the material at hand for use. It is not inconceivable that circulation may have been established by the suffering produced by an overloaded stomach demanding distribution of its contents. The structure of the Cœlenterata offers

the structural conditions of such a process. A want of propulsive power in a stomach or body sac occupied with its own functions, would lead to a painful clogging of the flow of its products, and the "voluntary" contractility of the body or tube wall being thus stimulated, would at some point originate the pulsation necessary to relieve the tension. Thus might have originated the "contractile vesicle" of some protozoa, or contractile tube of some higher animals; its ultimate product being the mammalian heart. So with reproduction. Perhaps an excess of assimilation in well-fed individuals of the first animals, led to the discovery that self-division constituted a relief from the oppression of too great bulk. With the increasing specialization of form, this process would become necessarily localized in the body, and growth would repeat such resulting structure in descent, as readily as any of the other structural peculiarities. No function bears the mark of conscious origin more than this one, as consciousness is still one of the conditions of its performance. While less completely "voluntary" than muscular action, it is more dependent on stimulus for its initial movements, and does not in these display the unconscious automatism characteristic of the muscular acts of many other functions.

Bearing in mind the property of protoplasm to organize machinery which shall work automatically in the absence of consciousness, we can glance at the succession of vegetable forms. The active movements of the primary stages of the Algae are well-known. After swimming actively through the water, they settle down, take root, and assume the role of plants. The *Aethalium*, swimming with the movements of a Rhizopod, has been known to take food before establishing itself on the damp piles of the tan-bark, where it speedily becomes a low form of fungus. The approximation of the lower forms of plants to animals is notorious. The fungi, it is said, are the only terrestrial plants which live like animals on organic matter, appropriating the humus of their rich nidus in a state of solution. Now the paleontology of animals has absolutely established the fact, that the predecessors of all characteristic or specialized types have been unspecialized or generalized types, "neither one thing nor another." It may then be regarded as almost certain, that the ancestors of the present higher types of plants, were more animal-like than they; that the

forms displaying automatic movements were more numerous, and the difficulty of deciding on the vegetable or animal nature of a living organism, greater than it is now. Hence it may be concluded that "animal" consciousness has from time to time organized its machinery and then disappeared forever, leaving as results the permanent form of life which we call vegetable. But it is not to be supposed that all changes of structure cease with the departure of consciousness. Given spontaneous movement (*i. e.* growth) and surrounding conditions, and the resultant product must be structures adapted to their surroundings, just as the plastic clay is fitted to its mould. And this is essentially the distinguishing character of vegetable teleology as compared with animal. In the average plant we see adaptation to the conditions of unconscious nutrition; in the animal, adaptation to conditions of conscious contact with the world under a great variety of conditions.

4. GROWTH FORCE.

The active processes of living beings are examples of conversion of physical forces, only differing from the conversions observed to take place in inorganic bodies, in the nature of the machinery which exhibits them. The construction of this machinery, as in its use when finished, involves a conversion of force, the resultant consisting of the attraction of nutritious material in definite new directions. This determinate attraction has been regarded as a distinct force, to which the name of bathmic, or growth force, has been applied. It differs from all the physical forces in this, that while they are only exerted inversely as the square of the distance, this one is in addition most excessive where pleasure has been experienced and weakest where pain has left its deepest traces. In other words, its movements express *design*, the essential condition of which is *consciousness*. It is thus evident that it differs utterly from all other forces, although a retrograde metamorphosis of matter is as necessary for its production, as for that of any of the other forces. Now, although the evidences that stimulated consciousness, or if you choose, mind, can modify structure, are, as matter of observation, not very satisfactory; yet, since the essential peculiarity of growth force is its instant attendance on the needs of consciousness, it is a permissible hypothesis that its activity is immediately due to consciousness. This activity is located in bioplasts which do not exhibit consciousness; whether it coëx-

ists with consciousness in brain bioplasts is unknown. The successive exhibitions of this force from the lowest to the highest of living beings, have ever been additions to the executive machinery of a more and more specialized consciousness. Thus it is that its results in structure have ever become more and more complex, that is, composed of an ever-increasing number of parts in some region of the organism. Hence another point of distinction from other forces exists, which has been pointed out in a previous paper. It is quite evident that the higher forms of life are the result of continued super-addition of one result of growth force on another, some examples of subtraction or simplification of parts being generally accompanied by a great preponderance of additions. This is evidence of the accumulation of the property of producing this kind of force, since each successive addition imposes on the growing animal a greater number of successive stages before the process reaches its termination, maturity. This involves the belief that the property of exhibiting frequent "repetitions" of growth activity exists in a higher degree in the reproductive bioplasm of the more complex animals, than in that of the lower ones. This is in accordance with the fact of the regular increase in relative complexity and bulk of the nervous system, which accompanies complexity of structure in other respects in the ascending scale of animals. Thus this force differs from all others, as remarked by Prof. Hartshorne, in that its expenditure ultimately increases the amount of its production, because it constructs machinery which feeds its especial organs more and more successfully. Although expended by becoming energetic, its energy produces the means of its own increase. Unlike the physical forces whose expenditure renders matter ever more inert, growth force when expended adds material which as a profitable addition, increases the power of the central machine from which the force emanates, by furnishing an increased supply of food.[2]

Thus it is evident that growth force is not concentric nor polar

[2] It is incorrect to say that growth force is "potential" in highly organized types, as it is undoubtedly expended in the movement of nutritive pabulum to a given locality. The maintenance of it in that locality is due to ordinary molecular cohesion, which can only be set free by greater molecular consolidation.

in its activity, as are the physical forces, and that its determinations are antagonistic to these. Its existence in the earth has been a succession of conquests over polar force, and if preceding assumptions be true, the gradual progress presented by animals in abandoning the symmetrical forms exhibited by the lower types, has doubtless been due to the constantly increasing amount of consciousness.

5. THE DOCTRINE OF THE UNSPECIALIZED.

It is, however, evident that the directing power of consciousness is limited by the nature of the matter with which it has to deal. There are certain fundamental necessities to which it must conform. No one supposes that any degree of power can make twice two equal to six, cause two solid substances to occupy the same space at the same time, or make an absolutely solid substance out of incompressible atoms of different forms. These involve the absurdity that something can be made out of nothing, or nothing out of something. From the present conduct of the inorganic world, it would appear to possess properties which render consciousness impossible to it. This is doubtless due to the relations existing between the atoms or molecules of which its various species consist. The movements it displays are polar. The colloid molecular state is, so far as this planet is concerned, the only one which we know to be capable of consciousness, and then only while in a state of active transformation. As we have seen, when protoplasm is once organized and working automatically, consciousness need not be present; and when this is absent, the rate of transformation, that is, the amount of food consumed is greatly lessened. The excess of expenditure during conscious activity over that necessary to unconscious activity, is well known. It is thus evident that organization renders consciousness unnecessary, so long as external conditions are unchanged, and most probably a degree of fixity may be attained which renders consciousness impossible. The history of the evolution of animal types is apparently an illustration of this truth. The relations of the divisions of the animal kingdom are those of the limbs, branches and trunk of a tree. Although the termini of the branches are successively nearer the root or starting point, as we proceed from the apex downwards or backwards, yet the connec-

tion is not from end to end of these. To find this we pass down the limb to its junction with the trunk, and trace the branches from the axis outwards. Thus with the branches of the animal kingdom. Although the divisions vertebrata, mollusca, echinodermata, etc., stand in an undoubted relation of succession to each other, there is no connection between the highest representative of one, and the lowest of another. It is the lower or less specialized forms of each which exhibit the relationship. Thus, among the articulates, the low group of the worms gives us connection with the mollusca above by *Brachiopoda*, and the echinoderms connect themselves with the *Vermes* by the less specialized *Holothurida*. It seems highly probable also that the point of contact of the *Vertebrata* with these is by one of the lowest divisions, formerly regarded as molluscan, viz: the *Ascidia*. The same principle holds good within the great divisions. The most specilized orders of mammalia are the *Artiodactyla*, higher *Perissodactyla*, the *Carnivora*, *Quadrumana*, and perhaps *Cetacea;* but the higher of these have not been derived from the lower. Modern investigations show that several of them have been derived from a common type of mammals of the Eocene period, which is intimately connected with their lower forms, while wanting in the features which give them their special characters. These two illustrations serve to explain the universal law of zoölogical affinity, and therefore of evolution.

The conclusion derived from a survey of this field is, that structure, like habit, when once established, is closely adhered to, and that the movement of growth force once determined or organized becomes automatic, *i. e.* independent of consciousness. Therefore a type which reproduces itself automatically becomes after a time so established as to be incapable of radical change in consequence of a molecular fixity which precludes it. Nevertheless susceptibility to influences of conscious stimuli may remain in some portions of the organism, and thus subordinate modifications of structure have their origin. When conditions of life change, as they often have done during geologic time, those changes of structure which are possible, take place under the stimulus of roused consciousness. But if the changes be radical, affecting the foundation processes of vital economy, the specialized forms must undoubtedly perish, and the life of the succeeding

time be derived from forms of less pronounced character. The adaptability of generalized types, as to habits, and the absence of mechanical peculiarities in their structure, explain fully the cause of their standing in ancestral relation to all the typical faunae of the earth.

Nowhere is this truth more remarkably illustrated than in the case of man, the predominant mammal of the present period. From the generalized mammalian fauna of the Eocene, the Carnivora developed a highly organized apparatus for the destruction of life and appropriation of living beings as food. The cloven-footed and odd-toed hoofed orders[3] are the result of constantly increasing growth of the mechanical appliances for rapid motion over the ground; the former superadding exceptional powers of assimilation of innutritious food. The proboscidians developed huge bulk and an extraordinary prehensile organ. The *Quadrumana* produced none of these things. In respect to speed of limb and powers of digestion, both in function and structure, they remain nearly in the generalized condition from which the other orders of mammals have risen. The limbs and teeth of man retain the characters of the primitive type. Yet but two species of proboscidians remain; the Perissodactyle multitudes are represented by but a few vanishing species. The day of the *Carnivora* has passed forever, and the remaining Artiodactyle herds exist but by the permission of their master, man. But past geologic time reveals no such abundance of true *Quadrumana* as the present period displays. These animals were evidently unable to compete with those of other types in seizing on the opportunities of living. They were excluded from the chase by the more sanguinary ancestors of the carnivora, and from the field by the multiplying herds of the swifter or more resistant hoofed animals. They possessed neither bulk, nor speed, nor cruelty to serve them in the struggle for existence. So they were doubtless compelled to assume an arboreal life, which required little or no modification of the limbs for its maintenance, although the ultimate production of the grasping thumb from their primitive squirrel-like feet, may be traced to this mode of life. The acquisition of a hand must be regarded as the first step in that marvelous accession of experiences which is the condition of mental development.

[3]Represented by the ox and the horse.

And this latter growth has taken the place of all other means of conquering a position in the world of life, so that man has even retrograded in the efficiency of bodily powers. He has lost the prehensile quality of the hind feet, and the special usefulness of his canine teeth. But the competition among men continues to be such as to render it in the highest degree improbable that he will, as a species, lose the position gained, or suffer any prolonged diminution of the power of intelligence.

Now it is obvious that the more restricted the conditions of the life of a given animal type, the more sensitive it will be to changes. Hence it is that the risks to the existence of *Carnivora*, *Artiodactyla*, *Proboscidia*, etc., are much greater than to the omnivorous, all adaptive order of *Quadrumana*. The same is true of mind. The greater the proportion of unconscious automatism of habits, the less the power of adaptation; and this must be the condition of all animals, whose structure is so specialized as to place them beyond reach of competition, or to cut them off from a wide range of experiences. The greater the degree of consciousness of stimulus, the greater will be the degree of adaptability to new relations, and to such constant rousing the unspecialized mind is always open. If without strong natural weapons, vigilance is the price of existence; if not confined by organization to a peculiar kind of food, ceaseless investigation is stimulated. And these are the mental peculiarities which distinguish the monkeys among all the Mammalia.

The reverse of this picture may now be described, as has been done by Prof. Vogt. It is well known that the young of many parasitic animals are free and active, and discover during migration the localities to which they afterwards attach themselves for life. During the early stages they present the characteristic marks of their order and class, and in some instances the males, remaining free, continue to do so. Such are the *Entoconcha mirabilis*, the *Sacculinae* and the *Trematoda;* the first a mollusc, the second a cirrhiped crustacean, the third a worm. On their becoming attached to their host a successive obliteration of their distinctive characters takes place, so that they become so simplified as to be no longer referrible to their proper class, but susceptible, as Prof. Vogt remarks, of being united in a single division. A similar process is observed in the structural degeneration of the Lernean

parasites, which are at first free, but afterwards become parasitic on fishes. There is in this instance a coincidence between degeneracy of structure, and loss of compulsory activity: not only is every function of their sluggish lives automatically performed, but consciousness itself must experience little stimulus.

From what has preceded, it is evident that automatism is at once the product and the antagonist of evolution, and that it is represented in structure by specialization. It appears also that consciousness is the condition of the inauguration of new habits, and this is only possible to structures which are not already too far specialized. This is doubtless true, whether osseous and muscular tissue be concerned in evolution, or whether it be nervous and brain tissue. Hence in the highest form of development, that of brain mechanism, automatism is the enemy, and consciousness the condition of progress. As a product of development, automatism is the condition of stationary existence, and constitutes its effective machinery, but every additional step requires the presence of consciousness. This may be expressed in the every-day language of human affairs, by saying that routine and progress are the opposite poles of social economy.

6. THE ORIGIN OF CONSCIOUSNESS.

This question has not yet been touched upon, nor is it necessary to give it prolonged attention at present. Consciousness is in itself inscrutable to us, and the contrast which it presents to physical and vital forces is the great fact of life. It is obviou enough that certain molecular conditions are essential to its appearance; drugs intensify or obscure it; concussions and lesions destroy it. It will doubtless become possible to exhibit a parallel scale of relations between stimuli on the one hand, and the degrees of consciousness on the other. Yet for all this it will be impossible to express self-knowledge in terms of force. The question as to whether the product of the force conversion involved is the consciousness itself, or only a condition of consciousness, may receive light from the following consideration.

Nowhere does "the doctrine of the unspecialized" receive greater warrant than in the constitution of protoplasm. Modern chemistry refers compound substances to four classes, each of which is characterized by a special formula of combina-

tion. These are called the hydrochloric acid type, the water gas type, the ammonia type, and the marsh gas type. These series are defined by the volumetric relations of their component simple substances: thus in the first, a single volume unites with an equal volume of hydrogen; in the second, two volumes unite with a single volume of hydrogen; in the third, three, and in the fourth, four volumes unite with the single volume of hydrogen. The weight ratios of these compounds are expressed by the following formulas—chlorine, oxygen, nitrogen and carbon being selected as typical of their respective classes: HCl, H_2O, H_3N and H_4C. Now it is an interesting fact that protoplasm is composed of definite proportions of four simple substances, each one representing one of the classes above named, or in other words, the capacity for proportional molecular combination which characterizes them. The formula $C_{24}N_8O\ H_{17}$ expresses the constitution of this remarkable substance. Now although the significance of these combining numbers is unknown, there is a conceivable connection between the characteristic peculiarities of protoplasm and the nature of the substances which compose it. It is probable that these, when in combination with each other, exert a mutually antagonistic control over each other's especial and powerful tendencies to form stable, and hence dead, compounds. It is therefore reasonable that the terms "unspecialized" or "undecided" should be applicable to the molecular condition of protoplasm, and in so far it is a suitable nidus for higher molecular organization, and a capacity for higher forms of force conversion than any other known substance. If also in inorganic types, as in the organic, the generalized have preceded the specialized in the order of evolution, we are directed to a primitive condition of matter which presented the essentially unspecialized condition of protoplasm, without some of its physical features. We are not necessarily bound to the hypothesis that protoplasm is the only substance capable of supporting consciousness, but to the opposite view, that the probabilities are in favor of other and unspecialized, but unknown forms of matter possessing this capacity.

Consciousness constitutes then the only apparently initial point of motion with which we are acquainted. If so, we are at liberty to search for the origin of the physical forces in consciousness, as well

as the vital; their present unconscious condition being possibly due, as in the case of the vital, to automatism; the automatism being the expression of the atomic type of the substance exhibiting it. And, doubtless, the simple quantitative relations of the lowest types of forces are related to correspondingly simple geometrical conditions of matter, both representing the simplest grade of automatic action and machinery. We may also suppose that all of these primary conditions were necessary to the production of protoplasm, the only form of matter known to us in which consciousness can persist.

In conclusion, it is obvious that the metastatic condition of protoplasm necessary to the *persistence of consciousness* could not be supported without a constant source of supply by assimilation. Hence it would appear that the preliminary creation of dead and unconscious substances and organisms were a necessary antecedent to the accomplishment of this end; at least under circumstances of temperature under which living brings or protoplasm exist on this planet. Without the unconscious inorganic and organic products of nature, consciousness could not exist on the earth for a day. No animal can maintain consciousness without food; and that food must be, in the main, protoplasm. Protoplasm is manufactured from inorganic matter by the (supposed) unconscious protoplasm of the plant. What form of matter originally gave origin to protoplasm is yet unknown, but it is obvious that the ordinary physical forces must have existed as conditions of its creation, since now they are absolutely necessary to its persistence. Hence we may view the succession of automatic activities, somewhat in the light of the fagots used by the elephant to lift itself from the well into which it had fallen. One placed upon another finally raised the footing to an elevation which enabled the animal to obtain its freedom.

Consciousness is the essential, and at the same time, the only condition of personality; so that in this view of the case we are led to a primitive personality, although not to what we call life. And the reason why this personality is to us so obscure a conception, is probably to be found in the fact that it as well as ourselves is conditioned in its relations to matter, by necessary laws of "mathematical" truth.

E. D. Cope.

EDUCATIONAL REFORMS AND REFORMERS.

I.—THE BRITISH SYSTEM OF EDUCATION, BY JOSEPH LANCASTER.

[Education, or the conformation of the real in humanity to its ideal, is a theme of inexhaustible interest, even to the most prosaic age. Not only do theories of education sunder party from party, but they are, in the last resort, the only ground of division among thoughtful men. One party holds to the omnipotence of educational methods, as embodied in schools and institutions, and is radical, or socialistic it may be. Another believes more profoundly in the force of the human inheritance of character and habit from past generations, and is conservative. Or one party holds that within the range of human life and its resources, lie all the means for the perfection of mankind, and it is positivist. Another regards the self-elevation of the race as analogous to the process of getting into a basket and lifting one's self up by the handles; it looks for a will and an intelligence outside the race to call forth the will and the intelligence of the race; it is therefore theistic—religious, if you will.

The story of educational reformers is of perpetual interest, not only because it includes many of the greatest men of the past—Charlemagne, Alfred, Bacon, Luther, Loyola, Milton, Comenius, Locke, Kant, Lessing, and the like—but because we find ourselves in them. We cannot enter into life with any sincere purpose to better the world, and not come upon this question among the very first: How shall the child be trained to true manhood, and the man to even truer manhood? How shall we infuse organizing intellect and will into the huge, inert, inorganic mass, that adds to the bulk rather than the life of humanity? All political parties, all churches, all lovers of men, are busied with these problems, are trying with more or less success to answer them. All literature is but the primer and text-book of a larger school, and whoso has aught in him that he thinks worth utterance, sits in the seat of the teacher.

The subject of the first of these sketches, furnished us by an obliging contributor, depicts the man who first brought the educational problem as regards the illiterate classes fairly before the

English people. The English Reformation, unlike the German and the Scotch, originated no movement for the extension of education to the lower classes. Down to our own times no sufficient steps had been taken in that direction by the English people. But at the beginning of this century, the interest in the subject that was awakened by the French Revolution found a representative and an utterance in a man of some weight and worth, if not of the first order—Joseph Lancaster. Never was there a more thorough Englishman in the intensely practical drift of his thinking. To him the question is not chiefly "Which of all the manifold subjects within the range of human knowledge is best worth the teaching, is most likely to call into vigorous play the powers of mind and conscience?" but these rather: "How shall we organize the mechanism of the school-room out of the existing human material, so that a fair proportion of teachers shall be secured for this great untaught mass?" "How shall the order of the school be so provided and secured as that the discipline of the school shall mould the characters of these pupils, and make them fit for their place in society?" Both questions are exceedingly English, and both are very ably met by Mr. Lancaster in his well named "British System," whose intensely national character was no doubt the chief secret of the charm it exercised over many of his countrymen.

The British School Society formed on this basis, we believe, still exists. As late as 1848 we hear of an English Inspector complaining of the schools under its charge as unsatisfactory. Their principal distinction from other schools—apart from the monitorial system—is their very free use of the Bible as a text-book, to the exclusion of all sectarian works and comments. The Bible—as Prof. Huxley says—is a very valuable educational manual; but the bare use of its letter, with no attempt to get at the spirit and enforce the sense, cannot be fruitful of any great results. As it is used, for instance, in our own public schools, the original Greek and Hebrew might as well be read as the English translation. And beyond this bare literal use of the Bible—another British notion, transplanted however to our side of the Atlantic—the British and Foreign School Society does not seem to have gone.—ED.]

The following sketch of the Lancaster School System is taken from a small octavo of 130 pages, re-printed in Washington in 1812, entitled "The British System of Education, by Joseph Lancaster"

The author's claim to the improvements and inventions of his system is thus given: "This plan cannot be found in any other work unless copied or pirated. Of all its ideas, there is but one borrowed, and that is from the Madras or Hindoo mode of education, printing in sand, and even that is materially improved. It only is applied to the A B C class."

The want of lucid arrangement in his presentation of the plan as a whole, makes it necessary to gather, from different portions of the book, the necessary statements relating to each department of the system. Lancaster must have been a better lecturer than writer, judging from the wonderful success of his lectures in so deeply impressing the public mind with the value of his plan of education as to lead to its adoption in so many towns and villages in Great Britain, and its introduction into this country.

The object presented, in the beginning, was a humanitarian, as well as an educational system. The hitherto neglected children of the lower classes were to be gathered and saved from pauperism and crime by being taught reading, writing, arithmetic and the first principles of Christianity, and thus trained to become useful members of society. The system invented by Mr. Lancaster, through which this desirable result was to be produced, he described as simple in its organization, economical and effective in its action, and suited to all classes of children.

A school of over or less than a hundred boys of different ages and capacities, with or without previous training, moral or educational, are to be brought together under one governor, who may also be the sole teacher, if the number of scholars does not exceed thirty. When the school amounts to more—"he must either do the children injustice or take one assistant or more, as the numbers increase, requiring three to one hundred and forty scholars. The economy of education depends on an *efficient* substitute being found for paid assistants. In other schools, as scholars increase, the attendant expenses rise in proportion. But do away with the expense of under-teachers as scholars increase, and if one master

only is wanted, one salary only is required. But this depends upon the boys being qualified to act as substitutes for paid assistants, which Lancaster says, "only can be done by simplifying the system of order and tuition, whereby both may be equal to the meanest capacity, and may consequently be delegated to any pupil in the school. This has been done by the author, and never was done till he did it. The consequence is, that as scholars increase, the expense for each individual decreases, leaving one master competent to teach many instead of few."[2]

The economy of the system is fully explained on this point, and he adds another feature in saving expense, "superseding in a great measure the use of books in tuition," while it doubles the actual improvement of the children, by the use of slates for copying, and cards suspended on the walls as lessons to be copied. Its effectiveness in promoting order, prompt obedience to commands, and in keeping every scholar busily engaged in the lessons or exercises—the simplicity of its organization by adhering strictly to a few important rules and arrangements—these were placed before the hearers so convincingly, as to inspire them with as strong faith in his system as was held by himself. The encouragement given by men of all classes—statesmen, philanthropists, noblemen, professors and clergymen, as stated in the work—would seem to have been exaggerated by Mr. Lancaster beyond probability.

A testimony however is given in the "Life of Mackintosh," proving the confidence that he placed in the theory and practical application of Lancaster's views. In one of his letters dated Bombay, July 25th, 1807, he writes: "Next to a parliamentary situation, I should prefer that of being the lawgiver of Botany Bay. If I could rescue at least the children of the convicts from brutality and barbarism by education, I should consider it an object to which I ought to devote the greater part of the remainder of my life. If I were appointed Governor or Chief Justice, with assurance of support from home, with a sufficient military force, with a store of schoolmasters from Lancaster, with some good Irish priests for their countrymen and good Methodists for the rest, I should most joyfully endeavor to introduce law and morality into that wretched country, and give it the fitting constitution for a

[2]Quoted in Lancaster's own words.

penal colony which was to grow into a great and prosperous community."

The estimate given by Macaulay of the value placed upon the opinions of Sir James Mackintosh, is given in an article written for the *Edinburgh Review:* "His judgments on men, on sects and books, had been often and carefully tested and weighed. He never yielded to the impulse of the moment, and his opinions were the ripe fruit of study and meditation." These charactiristics give additional weight to the testimony, and on reading extracts from the reports of the committees in different localities in England, on what had been accomplished by the system, there is sufficient evidence that Lancaster had brought out new ideas on education that had proved valuable and important wherever they were fully carried out. Even at the present day a writer on "Compulsory Education," in the New York *Tribune*, refers to "Lancaster as the first great educator to discover and apply certain universal principles to the aggregate school, that in his day were simply discoveries."

The essential distinction of Lancaster's system was the elementary school. It was limited to reading, writing, arithmetic, and the first principles of the Christian religion. The last subject was incidentally referred to, but the directions given how to teach the three previous branches of education are so thorough and practical as to warrant success in every case, save those where natural defects or mental idiosyncrasy prevented their application.

The inventor aimed at nothing beyond these, but these were to be perfected as far as possible by careful initiation and practice. The superficial training in the primary lessons is a frequent complaint in the high schools or colleges, as nullifying the opportunities of a wider range of studies and a higher culture.

A thorough knowledge of the elementary branches alone may prove a starting-point to a boy who presses onward through a course of self-culture until he rises, as many have done before him, to a high and honorable position; but without this advantage, college education may be a failure.

In tracing the formation of the Lancasterian system from the beginning to its completion, it appears to be a specimen of the perfection of machinery. The "inventor," as he calls himself, must have arranged every part of his model so as to move in har-

monious combination, without the least danger of friction in any of its parts.

It would seem as though the whole machinery of the school was to be moved by the one-man power; but Mr. Lancaster ascribes it to the system itself. "The authority is vested in the system, more than the person," is the statement given in his work.

On reviewing the whole plan, the most striking impression is the wonderful forethought exercised in every arrangement, to prevent the violation of the rules laid down as indispensable. Even the school-room itself, in its dimensions, its ranges of separate desks grouped in divisions for the different classes, the places assigned for everything, and everything to be in its right place, were all favorable to order. The careful grading of the classes as to proficiency; the whole occupied at once with their respective lessons dictated by their monitors, writing them on their slates—no idling or talking allowed, but every one attending to his own work in his own place—the changes of occupation were all important to give variety and prevent weariness by presenting different forms of mental exercise. In calling the classes to assemble each in their own semi-circles, in front of the suspended cards on the wall, where the separate monitors pointed to the lessons to be simultaneously read, or the sums to be counted up and answered —this roused to renewed mental action. With their attention kept fixed on the lessons before them, and their minds wide awake by being interested, it is natural that the result should be the formation of industrious habits and a love of order.

In one of the London Reports of the Lancaster Society to the patrons of the institution, it was stated that out of six thousand children of the lower classes educated there, there was no instance occurred of any one of them being called before a court of justice on a criminal accusation. This was a valuable comment on the early formation of habits of order and industry, with a thorough preparation for the right use of the educational tools of reading, writing and arithmetic, placed in their hands to enable them to become the builders of their future as good citizens and useful men.

In theory the system appears an impossibility, viewing children as they are in their varied individuality; yet the experiment has been acknowledged a practicability by those who knew it to be

an established success, notwithstanding these admitted differences in children.

There seems, however, something painfully mechanical in the system when we think of the living, sentient beings, full of the sportiveness of childhood, with its tendency to outbursts of individuality, to be placed under its machinery. It is only in the family, or, as a writer says, in "the natural plan of an exclusive instructor to every child," that individualism can find expression or become a study, so that the teacher can adapt the specific course of training required. There only can liberty be allowed to a child to seek knowledge for itself and in its own way, in the books where it can be found, or in collecting from the hills and woods the specimens he has seen described and illustrated.

The same writer quoted above states that in this day "the schools of society are necessarily gregarious." If, then, children must be gathered in masses, the arrangements of the Lancasterian school for the promotion of order, government and regularity in the exercises of the school room, and industrious application to the graded lessons adapted to the progressive advancement of the scholars, are well worth attention. We hear of no subsequent attempt to restore the system that Lancaster kept for so many years in successful operation. The loss of confidence in his character as a man, in later years, had no effect in lessening the confidence in his educational plan of those who had seen it tested and approved. Its intrinsic value is the same, and may, at least, be worth a trial as an experiment.

As some persons may be interested in the course pursued by Lancaster as the founder of his system of schools, the following special directions are copied from his work, and mostly in his own words. Beginning at the school room as the foundation of the plan, he thus describes it:

THE SCHOOL ROOM.

The best form for a school room is a long square or parallelogram.

All the desks should front the head of the school, that the master may have a good view of each boy at once; the desks should all be single desks, and every boy set with his face toward the head of the school. Room should be left between each desk

for a passage for the boys, that the scholars in one desk may go out without disturbing those in another. It is desirable that the desks and forms should be substantial and firmly fixed to the floor. The ends or corners of the desks and forms should be rounded off, as the boys, when going quickly in or out, are apt to hurt themselves by running against them. Passages should be left at the bottom and on one side of the school, or on both sides, when space allows. Children confined in a small school room can no more be expected to be in order than soldiers can perform their exercise without a sufficient parade-ground.

At the head of the school room there should be an elevated platform for the master's desk, as a convenient place to overlook the school; and whenever the floor can be placed on an inclined plane, it should be made so. The ventilation of school rooms should always be provided for, and they should be made as much as possible open every way to a free circulation of air. They should also be warmed by flues passing under the floor, so that there will be no necessity for the children to leave their seats to go to the stove.

Another plan for promoting order on entering the school. The boys sling their hats over their shoulders, as a soldier would sling his knapsack. Before leaving, the order to "unsling hats" is done by a simultaneons motion on receiving the command.

An important maxim is taught and observed, and never allowed to be departed from: A place for everything and everything in its place.

THE RULE BY WHICH CLASSES ARE FORMED.

On beginning a new school, when the children were gathered together, they were first examined separately as to their previous acquirements, and then classed accordingly. If only four or six were found nearly equal, they were placed together. The class may consist of any number, without limitation to any particular numbers.

GRADATION OF CLASSES.

The first or the lowest class of scholars are those who are yet unacquainted with the alphabet. This may consist of 10, 20, 100, or any number who do not know how to distinguish all their letters at first sight. If only twenty, one monitor can govern and

teach them—double the number will require two teachers. In this and every other class described in the plan and arrangement, the monitor has but one plain duty *to do*, and the scholars one also, to learn. This simplicity of system defines at once the province of each monitor in tuition.

The method of teaching is as follows: a bench is fixed on the floor for the boys to sit on; another bench, a foot higher, is placed for them to print on. This makes the desk, and in this there are ledges to confine the sand, leaving a space below, where the boys lean their left arms while they are printing on the sand with the right. The wood under the sand to be painted black, that the letter traced on the white sand may be seen distinctly. The monitor first gives out the letter to the class, then makes the letter on the sand before the child, who does not know how to do it, and requires it to retrace with its finger and continue until he can do it without assistance. The sand is smoothed over by a flat iron or a substitute made of wood after the lesson is over.

The letters are taught in three courses, according to similarity of form. (1) a line as in the letters I, H, T, L, E, F, i, l; (2) depending on the formation of an angle, as A, V, W, M, N, Z, K, Y, X, v, w, k, y, z, x; (3) a circle or a curve, as O, U, C, J, G, D, P, B, R, Q, S, a, o, b, d, p, q, g, e, m, n, h, t, u, r, s, f, j. The greatest difficulty in teaching is found in letters, the forms of which are alike and only distinguished by change of position—p, q, and b, d; but by making them at the same time, the children learn readily to distinguish them. Then again they are all printing at once, and it is curious and diverting to see a number of little creatures, many not more than four or five years old, some not so old, stretching out their little fingers with one consent, making letters. When this is done they sit quietly till the sand is smoothed by the monitor. By this mode, figures as well as letters are formed, following the same courses, until they become accurately and readily named.

ANOTHER METHOD OF TEACHING THE ALPHABET.

A pleasant change in learning the alphabet is provided for the little sand class by a large sheet of paste-board suspended from a nail on the school wall. Eight boys at a time are formed in a semi-circle before this alphabet, standing in their numbers marked

on the floor; similar numbers hanging round their necks, tied to a string or to one of their buttons, mark their grade of merit. The highest is the first questioned by the monitor, who points to a particular letter and asks, "What letter is that?" If he tells readily all is well, and he retains his place; but if he fails he forfeits it, with his number and ticket, to the next boy below who answers the question aright.

This plan promotes constant emulation. It continually employs the monitor's attention. He cannot look one way while the boy is repeating his letters another, or at all neglect to attend to him without being immediately discovered. It is not the monitor's business only to teach, but to see that the boys in his class or division teach each other. If a boy calls A by the name of B or O, the monitor does not say, "it is not B or O, but it is A;" he is to require the next boy in succession to correct the mistake of his senior. These two methods of the sand and alphabet card are made use of daily in rotation, and serve as mutual check and relief; figures are taught in the same manner. The teaching of this lower class is entirely connected with *printing*.

SECOND CLASS.

The second class consists chiefly of boys who, having learned to print the alphabet and figures in sand and readily to distinguish the same on the card, are then advanced to this class. Here they have regular desks, each with his slate and pencil ready to write as ordered. They have small slates on which they print, learn to make all the alphabet, small and large letters in *writing;* they learn these also from the cards, with *writing* letters. When they become fully familiar with these, then *words* are given—not separate syllables of a word, because children cannot attach any sense to mere syllables, and in fact they have no sense or meaning unless compounded into words above the comprehension of children in this class. The *words* given to be written should be so arranged as to contain all the letters of the written alphabet, which being recently learned would be easily forgotten, unless kept in memory by daily practice.

THE ORDER OF CLASSING FOR THOSE LEARNING TO READ.

1st Class, A B C.

2d " Words or syllables of *two* letters.

3d Class, Words or syllables of *three* letters.
4th " " " *four* "
5th " " " *five* "
6th " Reading or spelling lessons of two syllables and in Testament.
7th " Bible.
8th " A selection of boys who read best from the 7th class.

Thus each class has its separate set of lessons. Its attention is simply devoted to one object, and boys in one class are not to be suffered to mix or sit with the boys in another. After having learned the writing alphabet, whatever class the scholar may be in, he must write on the *slate* the same that he reads and spells in his reading or spelling lessons on the cards: in the two-letter class, he must write words of two; and so in course with three or four or five letters.

The order of teaching the children in school should be to have the 1st class next to the master's desk, and the other classes in numerical order after it. By this means the youngest children will be more immediately under the master's eye.

If the scholar can perfectly repeat all the lessons belonging to the 2d class, he must be placed in the 3d; if he can repeat well all belonging to the 3d, he must be in the 4th; the same rule to be observed in forming the 5th, 6th and 7th classes. The 8th class, to be the best readers from the 7th, are admitted to the use of books for the improvement of their minds, which the lower classes are not allowed.

FIRST CIPHERING CLASS.

The first object is to teach children to make figures. In order to do this, the class learning to make figures are assembled under the monitor by themselves in one part of the room. It is to be observed that the same boys who are in one class according to their proficiency in reading, are in another according to their progress in arithmetic. On the commencement they always go to their different reading classes, and afterwards, when ciphering, to their several arithmetical classes; and after they have done ciphering, return to their reading classes before they go out of school. The modes of teaching arithmetic are so simple and easy, that all

the boys who can read and write text-hand in four letters are put into the ciphering class.

GRADATION OF CLASSES IN ARITHMETIC.

No. 1 pupils, learning to make and combine units, tens, etc., 2. Addition. 3. Compound addition. 4. Subtraction. 5. Compound subtraction. 6. Multiplication. 7. Compound multiplication. 8. Division. 9. Compound division. 10. Reduction. 11. Rule of three. 12. Practice.

In teaching the Addition class it is not limited to number. The monitor takes an addition table, uniting units with units, and *tens* with *tens:* every boy has a slate. The monitor reads from the table, 9 and 1 are 10, etc., 25 and 1 are 26, etc., and other variations of the same table. When these are dictated each boy writes them on his slate. This method has also its counterpart: an arithmetical table is placed on the wall without the amount of each combination annexed; then the monitor puts the question how much are 9 and 4, and the boy is expected to answer the amount of the numbers given. The boys in this class are called out in successive numbers of twelve, each to answer questions applicable to the similar lesson of the day on the slate. These exercises are varied through the first four rules of simple addition, subtraction, multiplication and division. Then sums are given out to the whole class of 4 or 5 rows of figures in columns, then the questions asked respecting the amount to be set down on the slate, giving the amount of the several columns one by one. Then the whole amount in *words* must be written under the amount in *figures*. It is necessary that the most frequent combinations occurring in the first four rules should be made familiar to their memory; for the frequent recurring of one idea, if simple and definite, is alone sufficient to impress it on the memory without sitting down to learn it as a task. The scholars by writing acquire a thorough knowledge of numeration expressed in words and figures, without studying it as a separate rule. In fact, almost every *other branch of knowledge* taught in the *different classes in my school*, is acquired in the same easy and expeditious way from the *practice*, and not from the *study*. In giving out the sums to be set down on the slates, the monitor has a *printed book of sums* which his class is to do, and has also another printed book containing *a*

key to those sums on a peculiar plan, and which fully shows how it is to be done. Any boy that can read and numerate can perform this duty as well as the principal monitor, in reading the sum to be written on the slate. In this way, and by testing the sums by the *key* to see if the answers are correct, three times the usual quota of sums can be done and repeated by every boy. The expeditious progress made both in writing and accounts is so great, they need only commit to writing a very short specimen of their sums to satisfy their parents. By using their pencils well, they acquire an equal facility in using their pens.

DIFFERENT CLASSES OF MONITORS.

Monitors are of three descriptions—some for tuition, some for order, and in large schools inspecting monitors. Of these last very few are requisite, even in a very large school. It is the duty of the master to ascertain that each monitor is fully competent to teach the lessons of the class he is appointed to. As it respects arithmetic, the master should ascertain by individual examination, whether the pupil he selects as a monitor is proficent in the mode of teaching each particular sum or lesson appointed to be taught to his class. The monitors of reading and spelling should not only be able as scholars to understand and prepare the lessons they are appointed to teach, but be instructed in the mode of teaching.

APPOINTMENT OF MONITORS.

In the first five classes monitors may be appointed from the next superior class to teach the one immediately below it. This will ground the monitors in the lessons they have themselves last learned, by the act of teaching them. The monitors are responsible for mistakes committed; hence the necessity of their careful examination of the work of the scholars, before it is submitted to the inspection of the superintendent.

ORDER AND COMMANDS.

On a large scale of education it is unavoidable to do without giving many commands, and some of a very trivial nature. On my plan many of the commands, which in others would be given by the master, are given by the monitors. It is needful to limit the number as much as possible; it is an important object to

secure implicit obedience on the part of the scholars, and for the monitors to acquire as prompt a manner of giving them as will secure the attention of the classes, and lead to a ready compliance. The first of these objects is easily obtained: it is only to write down on paper the commands most necessary to be given by the monitor to his whole class; and it is *essentially* needful that he should not vary from the rule once laid down.

The practice of giving short commands aloud, and seeing them instantly obeyed by the whole class, will effectually train the monitor in the habit of giving them with propriety. None of the commands are in themselves a hardship; the power of example facilitates the establishment of order. Children are imitative creatures; they enter into a new school, they see all in order around them; they see promptness and alacrity in obeying every command given, and before the effect of the novelty is worn off new habits are formed. They do as they see others do, by the influence of example.

The classes should also learn to measure their steps, when going round the school in close order, to prevent what else would often occur from their numbers, treading on each other's heels or pushing each other down. In this case measuring their steps commands their attention to this one object, and prevents their being unruly or disorderly. It is not required that the measure be exact, or a *regular step*, but that each scholar should attempt to walk at a regular distance from the one who precedes him. Without the facility with which the authority of a monitor or commander may be delegated or transferred from one to another, the system of order would be a nonentity. Were it not on a level with the lowest capacity, capable of this delegation, and possessed of so much simplicity, these new modes of instruction, valuable as they are in themselves, would be inefficient. The attempt to promote learning, without the principle of order, would be like the efforts of the eastern nations, when Nimrod, in the despotism and pride of his power, attempted to build the Tower of Babel, but only succeeded in producing confusion and an abandonment of his schemes.

OBSERVATIONS FOR MASTERS.

There is one error teachers are apt to fall into: that of giving commands themselves, either calling aloud for order or silence

among their scholars. On the old plan of teaching, the authority of the master is merely personal. When he comes into school, fear produces silence, *pro tempore* at least. When he goes out, all is bustle and confusion, and the under-teacher is rarely regarded in the absence of the Principal. This originates in the personality of the master's authority.

In the army, authority is vested in the system more than the person. The station, more than the man, commands obedience, and the subordinate officer is as readily obeyed as the commander-in-chief. The order of war will not become disorder by an application of it to the purposes of peace.

The less a master's voice is heard among his scholars, the better he will be obeyed. He should be a silent by-stander and inspector. What a master says must be done, and in a school well regulated the business will go on as well in his absence as in his presence, because his authority is not personal. This mode of insuring obedience is a novelty in the history of education.

The various forms and designs of "Rewards and Punishments" to suit the different degrees of merit or offences, are fully described in several pages; many are strange and ingenious, but they are so unsuited to our times and ideas, that it is unnecessary to transcribe them.

THE SCHOOL CIRCULATING LIBRARY.

This excellent institution was formed in the Lancasterian school as a species of reward for the higher and more intelligent classes of scholars, as a school circulating library. The teacher has experienced during 13 years the advantage of this plan he adopted. The books are considered as school property, only lent to read, but never given away. Indeed, not only the children have been benefited, but a book has been known to be read at home by the parents and relatives of the pupils. One book has been known to pass through the hands of a hundred scholars. If a boy uses a book improperly, he is not allowed to have another. Every boy who is a candidate for the use of books in the library must obtain a given number of tickets as a reward of merit, equivalent to a given number of weekly tickets, to entitle him to a book according to its value. Only one book at a time to be lent, never to be kept more than a week, to be kept clean on pain of forfeiting the

privilege of the library. If a book is lost or negligently destroyed, the value to be paid by the parents or the pupil to forfeit his stock of prizes and tickets at the time of the loss.

SCHOOL CIRCULATING LIBRARY—LIST OF SOME OF THE BOOKS.

Martinet's Catechism of Nature. The Picture of London. Taylor on Dogs. The Wonders of the Horse. The Grammar of Geography. Power of Religion on the Mind, by Lindley Murray. The Book of Trades, or Library of Useful Arts. History of Discoveries and Inventions. British Nepos, by Mavor. The Naval Plutarch. The British Neptune, by Dr. Burney. The Grammar of History, by Sir R. Philips. The Wonders of the Microscope. The Wonders of the Telescope. Beauties of Sturm's Reflections on the Works of God, by Elizabeth Andrews.

To the above list other useful books were added, including the following works written by Priscella Wakefield: "Juvenile Travelers," "Family Tour in the British Islands," "Excursions in North America," and "Mental Improvement."

A REVIEW OF THE FOSSIL FLORA OF NORTH AMERICA.

FOR years, the explorations of Dr. F. V. Hayden in the Rocky Mountain regions, pursued under the direction of the Department of the Interior, have awakened a deep and general interest by the remarkable natural phenomena which they have brought to light. Not only have these explorations penetrated into unknown regions, tracing out broad areas the existence of which was not fully realized, and the discovery of which has been recorded as of as great moment as any of those made at our time. Not only have they reported great valleys in the middle of the mountains; parks prepared by their fertility for a future population; rich mining districts abounding in precious minerals; wonders of nature also, like the Geysers of the Yellowstone, rivaling in splendor the greatest marvels of the world; but they have

opened to science new fields of researches where American naturalists have found treasures of fossil remains, a world of unknown species of animals and plants, which enrich beyond expectation the annals of science of this country. The discoveries of remains of huge saurians and of mammifers, of deposits of rocks composed of shells of remarkable kinds, have been already recorded at different times, and even telegraphed through the country on account of their importance.

The great lignitic coal fields also, extending along the base of he Rocky Mountains in the whole width of the United States Territories, from New Mexico to Oregon, were scarcely known before the explorations of Dr. Hayden, who defined their outlines and areas, and recorded the multiplicity and richness of their deposits of coal. The Lignitic is for the West what the great Appalachian Coal region is for the East, but more valuable still perhaps for the commonwealth, as without these deposits of combustible mineral, the Rocky mountain regions, and the great western plains at their base, would be uninhabitable.

Our special branch of the researches pursued by Dr. Hayden's explorations, relates to vegetable paleontology. Collections of fossil plants have been extensively made under his direction, especially with reference to the determination of the geological age of the lignitic formations, and of the cretaceous Dakota group of Kansas. It is on this subject of vegetable paleontology that this article is written. I do not propose, however, to give herewith a description, nor even an enumeration, of the species of fossil plants which were discovered by Dr. Hayden; but to go through an abridged review of what is known as yet of the North American fossil flora; marking some of its essential characters at different periods, pointing out some of the results that have been already obtained by the application of vegetable paleontology to physical and geological science, and what we may expect from it when the field scarcely opened is explored with more interest and more exhaustive research.

A brief history of our North American flora, pointing to the origin of some of our more valuable and generally known species of trees, and to the preponderance and the facies of their families at different times, may prove of general interest, and be the more acceptable as it does not require for its comprehension any peculiar

acquaintance with botanical science. The few details necessary for the understanding of the whole may be explained in a few words.

The great primary divisions of the vegetable kingdom as they are generally admitted now, are: 1st. The Thallogens, plants with mere cellular tissue, like the Algæ or Sea-Weeds, the Lichens, the Fungi. 2d. The Acrogens, flowerless plants, like the former, but composed of a woody tissue and of vessels. To this class belong the Ferns, known by everybody; the Lycopods or Club-Mosses, the Equiseta, generally named *Horsetail.* 3d. The *Gymnosperms* or Cone-bearing plants, like the *Conifers* and the *Cycadeæ.* 4th. The *Endogens,* or Monocotyledonous plants, which grow and increase from the inside, like the *Palm,* the *Grasses,* the Lilies, etc., and 5th. The *Exogens* or *dicotyledons,* whose representatives mostly compose our present arborescent vegetation.

In regard to their character, these classes are generally admitted as of a gradually more complex and complete organization in ascending from the lowest division, the Thallogen; and it is also a well established opinion that in the geological succession of their representatives, the plants of the lowest order appeared first, and were followed by species of the other divisions, in the succession indicated above. The facts, however, in support of this assertion are not yet sufficiently ascertained.

The original or first crust of the earth's surface is composed of crystalline rocks, metamorphic or changed by fire, where no forms of organized bodies can be recognized. Vegetable life, however, seems manifested in these primitive rocks by deposits of graphite, a metamorphic carbonaceous substance, whose origin, like that of all the other combustible minerals of this world, is attributable to the plants, and to animals also, of which carbonis a compound. The Algæ of the simplest structure consist of single isolated cells; like the *Diatomaceæ* and *Desmidaceæ,* which are the smallest vegetables known, and which, simple as they are, represent, however, most beautiful and innumerable forms appreciable only by microscopical investigation. These kinds of Algæ live everywhere, in the hottest springs and the snow of the glaciers, on sand or mud, on every kind of substance; they multiply rapidly and in enormous proportions. In some localities, the water of the sea is colored to a depth of many feet and over a surface of wide extent by the pres-

ence of the *diatomaceae;* plants so minute in size that a million of them may live in a drop of water. The peculiar nature of these unicellular plants confirms the idea that they have appeared with the first consolidated strata of the globe.

To their life, therefore, the origin of the deposits of bitumen or carbon, as represented by graphite in the primitive rocks, is probably due. The temperature of these rocks, originally in a state of fusion, has been considered as an objection to this opinion. But even at the present epoch, Algæ of a higher degree of organism fill, by their threadlike filaments, basins of thermal water whose temperature reaches 100° C, as in the Hot Springs of Arkansas, or in the Geysers of the Yellowstone.

Immediately above the crystalline rocks, and from the beginning of the stratified deposits of the lower Silurian, whose substance has been derived from the disintegration and the removal of primitive materials, vegetable fossil remains are recognizable. They represent marine plants, of course, mostly of indefinite forms, like crushed bundles of filaments whose contours are obliterated in a black carbonaceous or bituminous mass. In passing higher up, in beds of the same period, the forms become more distinct and less disfigured by compression, but mostly remain simple however, like narrow cylindrical, rigid or flexuous stems, without branches and with smooth surfaces. These characters seem to indicate a simple structure of the Algæ by juxtaposition of elongated cells joined by their ends, as are now the threadlike filaments of the thermal springs. In ascending still higher—to the upper Silurian—these fucoids appear more diversified; they bear branches, their surface is wrinkled or striated in many ways, and their characters being thus more distinct and multiplied, they are open to analysis.

Already a number of them have been described from these strata. At the same time the fossil remains increase in number to such a degree that strata of shale or of limestone seem, locally, to be a compound of fragments of sea weeds. As these petrified plants apparently represent mostly the species of a coriaceous hard tissue, the profusion of their remains may give an idea of the exuberance of the marine flora during the more ancient periods of our earth. It was evidently still greater than at the present time, though the activity of this vegetation is now manifested to a high

degree by the heaps of the bladder weed and other species along our shores, as also in middle ocean by banks of the floating *Sargassum*, covering thousands of square miles, and thick enough to impede or almost stop the progress of ships. The fucoids of old, some of which were of great size, though composed only of vascular tissue and without woody fibres, *foreshadowed* the appearance of the coal plants, as already they did play in the economy of nature a somewhat analogous part. From their decomposition have resulted the deposits of bitumen or mineral oil, which man's ingenuity uses now to an advantage not equal, indeed, but comparable, to that which he derives from the coal.

The remains of sea-weeds do not give any indication of the temperature or the atmospheric circumstances governing our globe during that long Silurian period when water covered most of the surface of the earth, either in a condensed form, as fluid, or as vapor.

The temperature of the sea was of a higher degree, evidently, than it is at the present time even under the influence of tropical heat. The simple structure of the sea-weeds and their cylindrical form seem to indicate this physical fact by the co-incidence, remarked above, of confervoid plants of simple and analogous conformation found now in the hottest thermal water. In the whole thickness of the rocks formed during this long period, which in some countries, as in England, attain a thickness of 60,000 feet, no traces of land plants have been positively observed. A few cylindrical branches or mere impressions of branches upon clay, bearing upon their surface obscure scars resembling those of *Lepidodendron*, were lately discovered in the Cincinnati group of the middle Silurian. As they are associated in the same strata with fragments of fucoids and with deep marine mollusks, their relation is to be considered as being rather with peculiar forms of Algæ, so long as the evidence is not satisfactorily established from more distinct characters. It seems, therefore, that during the Silurian period no land surface was exposed above the surface of the water, or rather that the exposed land did not receive any kind of inhabitants—no plants, and consequently no animals.

In the whole thickness of the following period, the Devonian, the marine vegetation is still predominant, as testified by fucoidal remains profusely imbedded in the rocks, and by the numerous

and richest deposits of bitumen discovered as yet by human agency. The forms recognized in the fossil remains indicate a more diversified kind of vegetation, and a more complex and more perfect structure. Some of the species have already characters which seem identical with those of more recent fossil species, and even closely allied to some of our time. This correlation is explainable in two ways: First, In supposing that, as vegetables have characters in accordance with the surroundings wherein they live, marine plants vary especially according to depth and pressure, to the temperature of the water, and also to its proportion of saline or other mineral elements. All these agents are not subject to modifications either as distinct or as rapid as those which govern the atmosphere, and therefore the types of the Algæ are preserved for a long time less diversified and more widely distributed than those of the land plants. On another side, the difficulty of exact determination of fossil Algæ may be taken into account for explaining the cases of identity as merely apparent, the more important characters of those plants being more or less undiscernible in a fossil state. The first evidence of land vegetation is found at the base of the Devonian, in fossil remains of a Lycopodiaceous species whose size is about the same as that of the larger club-mosses of our woods. This species, named *Psilophytum* by its discoverer, Prof. Dawson of Canada, has evidently the characters of the club-moss family; branches unfolding like those of the ferns, by unrolling (circinate); stems dividing alternately by the forking, and bearing both upon their own bark and that of their creeping rhizomas, the scars or the marking of the point of attachment of the leaves. Most of the fossil species of this family are characterized and identified by the form and the position of these scars, which, though generally round upon the rhizomas, are rhomboidal and diversified indeed upon the stems. Originally, or when seen upon young branches wherefrom the leaves have been recently detached, these scars are small, scarcely the sixteenth of an inch in diameter; they increase, however, rapidly in size, proportionally to the enlarging of the stem, and upon large trunks measure sometimes one-and-a-half (1½) inches in diameter. In the oldest and more remarkable order of this family, that of the *Lepidodendræ*, the scars are generally contiguous and in spiral order. In

another, that of the *Sigillariæ*, they are more generally placed in vertical series and at a distance from each other.

The presence of the land plants recognized in the lower Devonian becomes gradually more marked in ascending, but rather by the increasing size of the representatives than by their number. A few stems only of *Lepidodendron* are recorded from the middle Devonian. In the upper part only do the remains of land plants become of more frequent occurrence. Here they represent already all the vegetable divisions recognized in the subsequent period, that of the Carboniferous, and even more. For in the United States, at least, the Chemung Period of the Devonian age has species of *Lepidodendron* and of *Sigillaria*, species of *Calamites* representing the Equisetacea family, a considerable number of ferns, already some of them typically allied to those of the coal, and a few species of uncertain relation; *Flabellaria* and *Noeggerathia*, known by long striated ribbon-like leaves, and which have been considered as representing a family of vegetables intermediate between the Lycopodiaceæ and the Cycadæ, and it has also, which is more remarkable in considering the vegetable scale of distribution, large trunks of fossilized and solidified wood, recognized by its structure as representatives of a genus of Conifers, the Araucariæ, some species of which still exist in the flora of our time, inhabiting the southern part of the American continent and the Southern Islands, New Holland and New Caledonia. The presence of these Conifers in the Devonian of North America is remarkable for two reasons: First, because they enter the land flora about the same time as the Lycopodiaceous species; and secondly, because as yet no remains positively referable to Conifers have been recognized in the Carboniferous formation of the United States, though species of the same relation are described from the sub-carboniferous measures of Canada and of England.

A few of the species of ferns of the Chemung group, or upper Devonian, are related to species of the coal measures, especially in the section of the Neuropteridæ; they greatly differ, however, in their general facies and their specific, and even generic characters. The Devonian type of the ferns passes up into the Umbral or sub-carboniferous formation of Pennsylvania; while in the west, where the sub-carboniferous is composed of a succession of limestone and sandstone strata, its flora is, on the whole, of the same type

as that of the coal, though of course in a far less number of representatives.

We have then in the East a sub-carboniferous flora of Devonian character; while in the West, the formation which is considered as of the same age is truly of the carboniferous type, without any exception. The difference is attributable to that of the composition and of the formation of the strata.

The land flora of the carboniferous period is known by the great quantity of fossil remains, corresponding, in their proportion, to the prodigious exuberance of a vegetation which has furnished the compound materials of the coal strata. Concerning the character of the plants, the coal epoch has been named the reign or the period of the *acrogens*—the whole flora, from the base of the millstone grit, or even from the first traces of the lowest beds of the sub-carboniferous, to the Permian, being represented by species of this class; ferns, Equisetaceæ, and Lycopodiaceæ, as remarked already. The ferns are very numerous; nearly three hundred and fifty species have been described by European authors, and half this number as yet is recorded from the North American coal measures. They are classed and specially defined by the forms of the fronds and the leaflets, and by the nervation. By these characters, the relations of the species of the same period to each other are sufficiently established; but not so well to the species living at this time, for the reason that these are generally classified and determined by the fructifications, which are rarely found in a fossil state, or not preserved distinctly enough to afford trustworthy points of comparison.

The first and most interesting group of these ferns of the carboniferous measures is that of the *Neuropteridæ*, mostly representing bush ferns of great size, whose widely-expanded fronds, many times branching, had compound leaves, with large cordate leaflets and a close flabellate nervation, their veins being either straight or curved backwards to the borders, dichotomous or forking in descending. The leaflets, which are generally found isolated or detached from the rachis when petrified, are in some roof-shales heaped and pressed upon one another in innumerable number, and thus, at first, appear as if derived from trees; but in some localities, as at Pomroy, Ohio, for example, the roof of the coal when exposed by the miners may be compared to a petrified

ground, strewn with stems, branches and leaflets of the same genus. These stems—or rather raches or fronds—are seen measuring six inches in diameter. The family of the Neuropteridæ is apparently the first represented, and the more generally predominant family in the coal measures. Some of its species are found in the sub-carboniferous coal beds of Arkansas, where they are marked with a large proportion of the remains of Lepidodendron; they become most numerous in the lower coal strata above the millstone grit, together with large species of *Alethopteris*, and sensibly diminish in passing up to the upper coal beds. Two or three species only have been found with the Pittsburg coal. In Europe one species, *Neuropteris Loschii*, one of the most common plants of the coal flora of both continents, passes up into the Permian. The family of the *Pecopteridæ*, some forms of which are comparable to species of *Pteris* and of *Cyathea* of our time, has already some representatives in the lower coal, especially species of *Alethopteris*, with their large leaflets. But it becomes more and more abundant in ascending, and in the upper part of the formation is the principal representative of the fern flora. A beautiful species, *Pecopteris arborescens*, has been found in barren shales far above the Pittsburg coal (or the productive coal measures), and in Europe, at least, it continues on in the Permian. These *Pecopteridæ* are generally represented by branches and leaflets which, many of them at least, are derived fragments from tree-ferns; their trunks, which are rare in connection with the lower coal beds, are locally very abundant in the middle and upper coal measures.

In the family of the Lycopodiacæ, the most interesting groups are those of the *Lepidodendron*, *Ulodendron*, *Sigillaria* and *Stigmaria*, whose characters, as taken from the scars of their bark, have been briefly remarked upon already. The remains of *Stigmaria* are especially numerous in the whole thickness of the carboniferous strata, and are distributed in every kind of rock, except in the limestones. They especially fill the clay beds under the coal, often appearing as the essential component of some of these beds, and sometimes, to a thickness of fifty feet or even more. They represent the rhizomas or floating stems of the Lycopodiacæ, Lepidodendron, Sigillaria, etc., these being the stems or trees that bear cones as their fructification. We recog-

nize the same conformation in the club-mosses of our epoch, which, like *Lycopodium inundatum*, *L. arboreum*, etc., have creeping stems bearing, on the under side, long, thread-like filaments penetrating the ground, or rootlets creeping in wet mosses or soft mud, while their fructius stems are erect and have leaves and cones. The more ancient Lycopodiaceous representatives in the coal are the *Lepidodendron.* The *Sigillaria* appear later and persist longer. While *Lepidodendron* species have not been as yet recognized in connection with the Pittsburg coal, many species of Sigillaria are there; and, in Europe, one species at least of this last genus passes up to the lower Permian.

The Equisetaceæ, or Horsetail species of the present time, have cylindrical, articulated stems, scarcely measuring one inch in diameter. The principal species of this group occurring in the coal measures, the Calamites, were trees similar in their structure, with hollow, articulated trunks, and striated surfaces, but comparatively of a great size, their trunks varying from two to eight inches in diameter. Their branches were borne at and round the articulations, and they had at the nodi whorls of narrow, small, linear, lanceolate, sharply pointed leaves. As these branches are rarely found attached to their stems, they were for a long time considered as representing distinct species, and separated in the descriptions under the fine name of *Asterophyllites.* These *Calamites* had a rapid growth; their stems grew close to each other, forming dense thickets, like the canes of the southern swamps, which each year rise up impenetrable groves by their compact vegetation. The *Calamites* appear early in the sub-carboniferous, or even the upper Devonian; they persist longer, passing up to the Permian, where they are represented by especially large species of the *Equisetum.* They have entered by their remains into the formation of all the beds of coal, and in some localities become the essential compound of the combustible matter.

Some other genera of the carboniferous flora are represented by water floating plants of comparatively small size and of more indefinite relations. The more important are the *Annularia*, or plants whose branches surrounded the stems, like the ribs of an umbrella, and whose cylindrical or flat lanceolate leaves, larger than those of the *Asterophyllites*, are like them placed in rows around the articulation of the branches, like the spokes of a wheel.

The *Sphenophyllum* also, with stems divided in about the same way as those of the former genus, had their leaves also in whorls, but flat, enlarged upwards or wedge form from the base, and with a nervation analogous to that of the ferns. These two genera represent apparently a family of plants intermediate between the Equisetaceæ and the Lycopodiaceæ. They are widely distributed in the whole extent and thickness of the coal measures, and limited to this formation. Like the Calamites, they are represented by few species, with however a very active and luxuriant vegetation, as indicated by the profusion of their remains. It was the same with the long ribbon-like leaves of Flabellaria, varying from one to three inches broad, which have been remarked upon already in the Devonian flora. Though their remains are most abundant in the Carboniferous, no plant has yet been found in connection with its essential organs, the fruit. The leaves embrace at the base a stem of from one to two inches in diameter, but even this stem has been very rarely observed. The relations of these plants have therefore exercised the researches and ingenuity even of Paleontologists without a satisfactory result; for this relation is still as uncertain as when, years ago, the celebrated Corda made the wel-known analysis of the texture of a stem. The leaves evidently represent different species, but their characters are uncertain. They have been described by authors under the name of *Flabellaria, Cordáites, Noeggerathia,* etc., and now Schimper, in his great work on vegetable paleontology, recalls the old name of *Pycnophyllum,* formerly proposed by Brongniart. Such are many plants of the coal measures whose characters and relation are vaguely pointed out by isolated organs, fruits, leaves or stems, and whose true nature is a secret which may only be revealed by new discoveries. The remains of these *Flabellariæ* which first appear in the Upper Devonian and have numerous representatives of two species in the strata of the lower Carboniferous, become still more abundant in the upper coal measures, and, in Europe, pass upward and into the Permian by two species also, the characters of which, however, here seem to be more positively related, and as a kind of transition, to the Cycadaceæ.

A summary sketch of the flora of the carboniferous cannot even give an idea of its luxuriance and fecundity. From the immense amount of materials which it has given to the production of the

coal, and from its general characters, it indicates the condition of the atmosphere at this period to have the character of an extremely humid, rather than a very warm climate. The whole atmosphere was impregnated with vapor, and, in conseqnence, with a proportionate amount of carbonic acid. These elements played the part then that they do now, promoted the activity of the vegetation to the highest degree, especially that of the ferns and the Lycopodiacæ, which by their present vegetation, show their present partiality for foggy countries, or the shade of humid forests, and of the Equisetaceæ, which live in swamps. The ferns were of much larger size than they are now, either as bushy species or as trees. Fossilized trunks of ferns have been found in the Ohio coal fields, measuring more than one foot in diameter; while at our epoch, and even in the tropical regions, the trunks are rarely half as large. The stems of our present species of lycopods and horsetails are scarcely half an inch thick, while trunks of Sigillaria and Lepidodendron have been recorded as measuring two feet in diameter, and, as remarked above, the stems of Calamites vary from two to eight inches in thickness.

This giant vegetation was not, on account of its huge proportions, deprived of beauty; on the contrary, nature seems to have given splendor to its work, in proportion and as compensation for the deprivation of animal life. The harmonious elegance of the coal flora is clearly manifested by its remains preserved by fossilization.

The trunks of Fern-trees, as those of *Sigillaria* and of *Lepidodendron*, of an exact cylindrical shape and of the same size in their whole length, finely carved upon their bark in spiral or vertical rows of scars, of diversified and always symmetrical and elegant patterns, represent the most elaborate designs of architecture. They are like fluted columns of Corinthian or Doric order, covered from base to top by garlands and arabesque, and crowned by capitals of equally elaborate style. These, adorned by depending fronds of parasitic ferns, support, as roofs, spreading recurved branches, arches, cupolas, domes, painted by the multiple forms of fern leaves, more diversified and more graceful and fair than could be any ornamentation inspired by the imagination and executed by the skill of the greatest painter. Under this canopy and in this dark temple of nature, wherein, as in the great cathedrals of old,

gloomy, subdued light penetrates only by bow-windows, fringed and latticed by interlacing ferns and branches, the ground is strewn by vegetable debris intombed under mounds of verdure. Upon the wide open surface of the swamps and bogs, the vegetable regime still manifests its power by extending over the whole its thick carpets of water plants with the interlaced floating rhizomas of *Stigmaria*, over which are raised and supported groups of *Calamites*, whose graceful branchless stems recall the forms of Moorish minarets, when seen from great distances on approaching the borders of the sandy deserts. There is not a paleontologist whose admiration has not been deeply excited by the study of the fossil remains of the flora of the coal formation. Some have tried to represent its aspect by the design of the painter, but designs, like descriptions, are vain in an attempt of this kind.

LEO LESQUEREUX.

(*To be Concluded.*)

FUSANG.[1]

IT is well known to those who are interested in American archæology that Chinese historians make mention of a land, called Fusang, which from its direction and distance from China is thought by some scholars to have been a part of Western America, probably Mexico. The story is that near the close of the fifth century of our era, there arrived in one of the provinces of China a Buddhist priest or missionary, who reported having visited this land of Fusang, gave a description of it, and stated further that he had been preceded thither by other priests, who had converted the inhabitants of the country to the religion of Buddha, and had introduced among them his sacred writings and images.

How much credit is to be given to this story, and whether there are sufficient grounds for identifying Fusang with America, are questions upon which hitherto it has not been easy to pronounce

[1] Fusang; or the Discovery of America by Chinese Buddhist Priests in the Fifth Century. By Charles G. Leland. Pp. 212. New York: J. W. Bouton. 1875.

an opinion. What has been written on this subject by scholars who have given special attention to it is mostly scattered in the pages of French and German society publications and in other works not readily accessible to American readers, while the allusions to the story of Fusang which one now and then meets in the writings of American antiquaries are meagre and unsatisfactory, and on the whole are not calculated to leave a very favorable impression of its value as a historical document. Mr. Leland has, therefore, done us a good service by collecting from these sources the principal evidence and arguments used to support this hypothesis of a discovery of America by the Chinese, and also giving the history and the present aspect of the whole question. He is himself a warm advocate of the claims put forward for the Buddhist priests, and, besides translating entire a valuable paper on the subject by the late Professor Carl Neumann, of the University of Munich, and citing the opinions and arguments of other scholars, who, like Neumann, were acquainted with Chinese literature and history, he has added some new evidence bearing on the case, principally to illustrate the ease with which the passage from Asia to America can be effected, and the probability of communication between the two continents having formerly been not infrequent.

Mr. Leland, is, however, far from claiming that as yet there have been obtained any conclusive proofs of this supposed visit of the Chinese to Mexico. The utmost that he maintains is, that the story has an air of truthfulness which entitles it to serious consideration; that the opinion that Fusang was some part of America was at the first well grounded and has been strengthened, rather than weakened, by recent discoveries; finally, that while the former presence of Chinese on this continent has not absolutely been proved, there are many indications of it, and further investigation will probably settle this question definitely. His object in publishing this book has been rather to commend the subject to the attention of scholars who are in a position to make further researches, than to attempt to establish the claims of the Chinese on the evidence which is at present available. That he has succeeded in placing the case in a very favorable light, none of his readers will be disposed to deny. In fact, far as it is from being decided, it rests, we think, on quite as solid a basis, both of *a priori* probability and of evidence, as that of the

Northmen who are thought to have visited the eastern coast of America in the eleventh century.

The "Chinese theory" is probably the least generally known of all the theories of pre-Columbian discoveries of America, and we presume a brief review of it will not be unacceptable to our readers.

The story of Fusang, of which an abstract is given above, occurs for the first time in Chinese literature in the form of a regular entry in one of the "Year-Books," in which were kept the accounts of the Empire and notices of important events which took place in the several provinces. These Year-Books are regarded as of the highest authority on points of Chinese history, and this account of Fusang seems, therefore, entitled to a degree of consideration which could not be claimed for any mere floating tradition. As the value of the speculations based upon it will be judged in a great measure according to the accuracy with which the description of Fusang applies to America, we shall here transcribe the account entire, as it has been translated by Mr. Leland from Professor Neumann's German taanslation of the Chinese original. It may be well to premise, however, that the Fusang-plant, from which the country derived its name, is supposed by the advocates of the story to have been the *Agave Americana* or Maguey of Mexico, and that Tahan is believed by Professor Neumann to be Alaska; by others, Kamtschatka. The account is as follows:

"During the reign of the dynasty *Tsi*, in the first year of the year-naming, 'Everlasting Origin,' (A. D. 499,) came a Buddhist priest from this kingdom, who bore the cloister name of Hoei, Shin, *i. e.*, Universal Compassion, to the present district of Hukuang, and those surrounding it, who narrated that Fusang is aboutwenty thousand Chinese miles in an easterly direction from Tahant and east of the Middle Kingdom. Many Fusang trees grow there whose leaves resemble the *Dryanda Cordifolia;* the sprouts, on the contrary, resemble those of the bamboo tree, aud are eaten by the inhabitants of the land. The fruit is like a pear in form, but is red. From the bark they prepare a sort of linen which they use for clothing, and also a sort of ornamented stuff. The houses are built of wooden beams; fortified and walled places are there unknown.

"They have written characters in this land and prepare paper from the bark of the Fusang. The people have no weapons, and make no wars; but in the arrangements for the kingdom they have a northern and a southern prison. Trifling offenders were lodged

in the southern prison, but those confined for greater crimes in the northern; so that those who were about to receive grace could be placed in the southern prison, and those who were not, in the northern. Those men and women who were imprisoned for life were allowed to marry. The boys resulting from these marriages were, at the age of eight years, sold as slaves; the girls not until their ninth year. If a man of any note was found guilty of crimes, an assembly was held; it must be in an excavated place. There they strewed ashes over him and bade him farewell. If the offender was of the lower class, he alone was punished; but when of rank, the degradation was extended to his children and grandchildren. With those of the highest rank it attained to the seventh generation.

"The name of the king is pronounced Ichi. The nobles of the first-class are termed Tuilu; of the second, Little Tuilu; and of the third, Na-to-scha. When the prince goes forth, he is accompanied by horns and trumpets. The color of his clothes changes with the different years. In the first two of the ten-year cyclus they are blue; in the next two, red; in the two following, yellow; in the next two, red; and in the last two, black.

"The horns of the oxen are so large that they hold ten bushels. They use them to contain all manner of things. Horses, oxen and stags, are harnessed to their wagons. Stags are used here as cattle are used in the Middle Kingdom, and from the milk of the hind they make butter. The red pears of the Fusang tree keep good throughout the year. Moreover they have apples and reeds From the latter they prepare mats. No iron is found in this land; but copper, gold, and silver are not prized, and do not serve as a medium of exchange in the market.

"Marriage is determined upon in the following manner: The suitor builds himself a hut before the door of the house where the one longed for dwells, and waters and cleans the ground every morning and evening. When a year has passed by, if the maiden is not inclined to marry him, he departs; should she be willing, it is completed. When the parents die, they fast seven days. For the death of the paternal or maternal grandfather they lament five days; at the death of elder or younger sisters or brothers, uncles or aunts, three days. They then sit from morning to evening before an image of the ghost, absorbed in prayer, but wear no mourning clothes. When the king dies, the son who succeeds him does not busy himself for three years with State affairs.

"In earlier times these people lived not according to the laws of Buddha. But it happened that in the second year-naming 'Great Light,' of Song, (A. D. 458,) five beggar monks from the Kingdom of Kipin went to this land, extended over it the religion of Buddha, and with it his holy writings and images. They

instructed the people in the principles of monastic life, and so changed their manners."

The same Buddhist priest who gave this account of Fusang, also told of a country inhabited only by women, which lay a thousand *li*, or Chinese miles, still farther towards the east. But the whole story is intermixed with so much fabulous matter that Professor Neumann did not think that it was worth translating. Great stress is laid, however, by those who accept the remainder of the narrative, on the fact that Hoei-Shin describes this land of women on hearsay evidence only, and does not profess to have visited it himself. What he narrates as an eye-witness is of a different character. Although not entirely without its difficulties, still it contains nothing which can confidently be pronounced fabulous; but, on the contrary, is, for the story of an early traveler to a strange land, remarkably free from extravagant statements.

Other notices of Fusang occur in Chinese and Japanese literature. Those given by the historians appear, however, to be simply repetitions of this account in the "Year-Book;" while the Fusang of the poets and romance-writers, which was a land of marvels, is, it is claimed, the creation of a later age, and has, therefore, no place in the present inquiry.

This narrative of Hoei-Shin was first brought to the knowledge of European scholars, about the middle of the last century, by Deguignes, a learned French sinologist, who published in the "Mémoires de l'Académie des Inscriptions et Belles Lettres," an able paper in support of the view that Fusang was ancient Mexico. This view was subsequently attacked by Klaproth, who, without denying the truth of the story, was of the opinion that the Buddhist priest had not passed beyond the limits of Asia, and that Fusang was most probably the Island of Saghalien. Other scholars have, however, since re-advocated the view of Deguignes. Among them are Professor Neumann, whose paper forms the basis of the volume before us, and D'Eichthal, who reviewed the essay of Klaproth, and, as Mr. Leland thinks, confuted all his arguments. To go over the whole ground of this discussion is impossible in this place. It must suffice to present a few of the strong points in the evidence which supports Deguignes' view of Fusang, and to point out some of the obstacles which must be removed before it can be accepted as established.

It is urged, as strong presumptive evidence that the journey of Hoei-Shin was actually performed, that the fifth century was a period of remarkable activity among the Chinese Buddhists. During this century they prosecuted vigorously the work of proselytism enjoined upon the followers of Buddha, and frequently undertook long and perilous journeys for this purpose. The books of travel of Buddhist missionaries form of themselves a somewhat extensive literature, the value of which, as a source of information respecting the ancient geography of Asia, is now fully recognized by European scholars. There is nothing exceptional, therefore, in the story of Hoei-Shin and the "five beggar monks from Kipin." It is also an admitted fact that in the fifth century the geographical knowledge of the Chinese was already very extensive. They had a good knowledge of India and of the rude nations which surrounded them on the north and west. In the Pacific they had extended their discoveries southward at least as far as New Guinea, and northward to the sixty-fifth degree of latitude. They were acquainted with Kamtschatka, and probably with the Aleutian islands; and there is reason, Mr. Leland thinks, to believe that they maintained with the natives of these regions a regular trade in furs. At any rate, voyages or journeys in this direction are spoken of as events of ordinary occurrence. The precise locality of Tahan, the point of departure of Hoei-Shin, is still a matter of discussion. It is known, however, to have been "twenty thousand *li*" northeasterly from China, and whether it was in Kamtschatka, as thought by Deguignes, or was the peninsula of Alaska, as thought by Neumann, a journey of twenty thousand *li* to the eastward would most certainly have left the traveler in some part of America. It is to be noted, in this connection, that the route which appears to have been taken by the Buddhist priest—along the Aleutian islands, which stretch in an unbroken chain from near the coast of Kamtschatka to the American shore—is that by which this continent could have been reached the most easily by adventurous Chinese voyagers.

Thus far the argument, above outlined, proceeds smoothly enough. Indeed, could the case rest here, the proofs that Fusang was in some part of America—always assuming that the story of Hoei-Shin is entirely trustworthy—are so strong as to be almost irresistible. But in order to place the matter beyond question, it

must be shown that the description of Fusang applies to America, and that there is to be found in America unmistakable evidence of its former occupancy by Chinese Buddhists. Could either of these propositions be affirmed confidently, the question would be well-nigh settled; but this part of the inquiry is at present in a state very far from satisfactory.

Some parts of the description certainly do seem applicable to America. The Fusang-plant naturally suggests the Maguey, which subserves so many uses among the natives of Mexico; and the absence of iron in Fusang, and the small account there made of gold and silver, recall to mind the same country. Again, the manner of contracting marriage in Fusang, although not known to have been practiced by the ancient Mexicans, is strikingly American; customs very similar to this exist, as Mr. Leland remarks, in more than one North American tribe. But as an offset to these and some other points in the description upon which those who seek for Fusang in America rely, is the mention by Hoei-Shin of wagons and draught animals, among which is expressly named the horse. This part of his description is entirely at variance with all that is known of ancient America, and, until it can be accounted for more satisfactorily than has yet been done, is an obstacle to this view which is not easy to overlook. It is well known that neither the Mexicans nor the Peruvians had any draught animals, and that the horse, although found among the extinct animals of America, did not exist in any part of this continent at the time of its discovery by the Europeans. Professor Neumann suggests, indeed, that "it is possible that the Chinese described an animal similar to the horse with the character *Ma* or horse, for changes of this nature are of frequent occurrence;" and Mr. Leland cites instances of the very common practice among the ignorant of naming strange animals from their resemblance to those that are familiar, as when the Gypsies call the fox the "wood-dog," and the elephant the "great-nosed-horse." But it will be remembered that Hoei-Shin does not speak of this animal as simply horse-like—as a horse with some distinguishing mark—so that these are not strictly parallel cases. This point is the more noteworthy, because he is at some pains to distinguish the Fusang-plant which he saw from that known in China. It was not identical with the Chinese plant, he says, but only like it in

some respects. It may be as Professor Neumann says, that, however the error may have originated, "the unprejudiced and circumspect inquirer will not be determined on account of it to declare the entire story of Fusang-Mexico an idle tale;" but he surely will not overlook the fact that this is one of the few points in the description on which we can take a strong hold, and, until it is disposed of fully, it will out-weigh a vast deal of otherwise plausible argument.

Again, when we examine closely the description given of the Fusang-plant, it is by no means clear that the American aloe is the one meant. It appears that the plant known to Chinese botanists as the Fusang is quite dissimilar to this found in Mexico, and Mr. Leland, who has dicussed the matter at some length, is driven to the hypothesis that Hoei-Shin had in mind a different Chinese tree—the Kousang—when he made the comparison. He leaves unnoticed, however, what seems a much more serious difficulty in the way of this identification, viz., the express statement, twice repeated, that the Fusang bore a red, pear-shaped fruit, which is not the case, we believe, with the American aloe.

This is, we think, a fair presentation of this portion of the question as it at present stands. The greater part of the description given of Fusang relates to customs and institutions with respect to which it is difficult to say whether they bear an American or an Asiatic stamp, and which can at best hold an unimportant place in the argument. Of the few remaining points which have a more certain value as evidence, unfortunately those which make squarely against the view of Deguignes seem quite as strong as those urged in its behalf. In fact, the extreme doubt which can be cast on the identity of America with the country described by Hoei-Shin is decidedly the weak point in the whole case. Yet we are not disposed on this account to abandon it as utterly hopeless, or to pronounce the story of Fusang "an idle tale." The authority upon which the story rests, its sober, matter-of-fact appearance, the strong support which can be given to it on the Asiatic side of the Pacific, the consideration that a visit to this continent was not impracticable to the Chinese at that period, and that its actual accomplishment is not wholly improbable—are sufficient reasons for not abandoning this inquiry so long as there is hope of obtaining some confirmatory evidence on the American

side. To recur a moment to the question of the internal evidence afforded by the narrative, a fact which strangely enough is overlooked both by Professor Neumann and by Mr. Leland, may possibly, when candidly considered, throw some light on the source of the chief perplexities in the description. Both these writers have treated the account in the "Year-Book" as if it had been written by Hoei-Shin himself. Whether there is any direct evidence on this point we are not told; but from the way in which the account reads, the more natural inference, we think, is that he was not himself its author, but that it was written by some official who entered in due form a report returned from the province. The Buddhist priest *may* have furnished a written statement to be copied, but there seems to be no warrant for this supposition. Of course it is useless to conjecture whether the writer of the account had seen and conversed with the returned missionary, or merely reported a matter of common rumor in this part of the empire. In either case it is quite consistent with probability that the account is substantially correct—that the direction and distance of Fusang from China, the existence there of a remarkable plant, the abundance of gold and silver in the country, and other main facts are correctly stated—and yet that it contains errors which, had it been revised by Hoei-Shin himself, would have been stricken out. While this view of the character of the entry in the "Year-Book" must necessarily throw some distrust on the whole story, by introducing into it a hear-say element, we do not see how it can well be rejected, and it may, after all, be quite as favorable for the advocates as for the opponents of the claims of the Buddhist priests.

We have said nothing on the subject of traces of Buddhism in America, simply because none sufficiently well marked to deserve serious consideration have as yet been found. When, however, it is remembered that this supposed visit to America took place fourteen hundred years ago, it is manifestly unfair to insist strongly on the significance of this negative evidence. At the same time it cannot be denied that the discovery on this continent of some relics of these Buddhist priests—some of their writings or images, or else some distinct and unequivocal traces of their doctrines—can alone settle decisively the question of Fusang. At present it is very far from being decided, and the weight of the evidence and

probability that America was, as is alleged, discovered by Chinese in the fifth century, is a point respecting which very wide differences of opinion can be tolerated.

In conclusion, we must pay a tribute to the entire fairness with which Mr. Leland has met the arguments of those who oppose Professor Neumann's view of Fusang, and to his extreme caution in discussing a very obscure and therefore a very tempting subject. His principal object, as before stated, has been to present the case of the Buddhist priests in such a light as will show it to be deserving of more attention than it has yet received from American scholars, and this he has done in a very satisfactory manner and with a full and candid admission of its weak points. His book is one which we can cordially commend to all who are interested in the study of pre-historic America, and we trust it will fulfill its mission, and will incite to further research, both in this country and among the archives of the Chinese.

In a paper read before the New York Geographical Society, in January, 1873, by Augustus Le Plongeon, M. D., on the "Vestiges of Antiquity," evidence of the former presence of the Chinese on this continent is adduced which, if it can be unreservedly accepted, is conclusive. It is stated by Dr. Le Plongeon that there have been found in a district of Peru several antique images, seen by himself, which are inscribed with characters resembling the Chinese, and actually recognized as such by an "intelligent Chinaman" who examined them. As this discovery has a direct bearing upon the story of Fusang, and as Mr. Leland has made no mention of it, and perhaps is not aware of it, we will extract here the entire passage from Dr. Le Plongeon's paper:

"To-day, on the northern coast of Peru, exists a small village, called Eten, the dwellers of which speak a language that their neighbors are unable to understand; but they find no difficulty in holding communion with the Chinese coolies, who of late years have been imported thither. Besides, in searching among the ruins of the Grand Chimu's City, situated between Trujillo and the port of Huanchaco, some silver idols have been found, inscribed with very ancient Chinese characters. Some have likewise been dug up from the mounds in the Valley of Chincha Alta, 400 miles to the southward. I have examined these idols carefully. They bore marks of being very ancient. Two that were in my possession represented a man sitting cross-legged on

the back of a tortoise. The head was shaved, except the top, from which depended, hanging on the back, a lock of long hair braided Chinese fashion. In one of them the hands were wanting. This was placed between two pillars, surmounted by a perfect arch. The characters sculptured in alto relievo on the pillars were so time-worn and defaced as to be illegible. Not so with the other. The arms of the figure were extended; the hands rested on short pillars. There was no arch. And notwithstanding this relic was very much eaten by the rust and the salts contained in the earth, where for many centuries it had lain undisturbed, some signs were plainly visible on the pillars. They somewhat resembled the Chinese writing, but seemed somewhat different from those in use to-day.

"The finding of these relics was quite important, in my estimation. I set forth in search of a person who could interpret them for me and dispel my doubts. I knew a very intelligent Chinaman, acknowledged to be by his countrymen a gentleman of great literary attainments. He examined the queer object for a long time; looked at it on every side; then, without speaking a word, looked at me—looked at my relic again, his features betraying astonishment, nay veneration, not altogether free from awe. He was evidently overcome by a strange feeling. 'Very old,' said he at last. 'These are very ancient characters, used in China thousands of years ago—before the invention of those now employed. They mean *Fo-Hi*.' This was sufficient. In remote times the Chinese had visited this country, and no doubt the present dwellers of Eten are some of their descendants."

It is to be regretted that, in a matter of this importance, Dr. Le Plongeon was not able to give the opinion of some competent Chinese scholar. As it is, those inclined to be skeptical will question whether these supposed Chinese inscriptions have any higher value than the Phœnician tablets which from time to time are dug up in various parts of America.

NEW BOOKS.

ENGLISH MEN OF SCIENCE, by Francis Galton, F. R. S.—D. Appleton & Co., New York, 1875. "Popular Science Library."

Among the most valuable results of the publication of Darwin's great work on the Origin of Species has been the production of works in which the same lines of reasoning have been applied to

other subjects besides Natural History. We need only instance the works of Buckle, Lubbock, Tylor, and that of Herbert Spencer on Sociology, now going through the press. Our appreciation of the value of these works does not necessarily imply an endorsement of them and their conclusions, but is based upon the fact of their calling forth such instructive discussions as have followed their publication.

Prominent among books of this class is the late work of De Candolle,[1] in which the recent history of scientific men was examined and commented upon. Men of science, as for the most part men of quiet and regular lives, were particularly fit subjects for such study; their lives being little disturbed by extraneous and ephemeral influences, but showing well the effect of deep reaching and permanent ones.

Galton, in continuing his studies upon the subject of hereditary descent,[2] was occupied at the time of the appearance of De Candolle's book upon studies of the same character but more extended scope, not limiting his examination to scientific men alone. Moved by some difference in the results obtained by De Candolle and those found by himself, he was led to make a special inquiry with regard to English men of science, in order to test the points still open to controversy.

This much of an explanation of the *raison d'etre* of the present work of Galton is necessary, in order to estimate at their true value his conclusions.

The most prominent feature of this work is the limitation of the inquiry to contemporary English men of science. The author thus states his reasons for such limitation. "The advantages are great of confining the investigation to men of our own period and nation. Our knowledge of them is more complete, and where deficient, it may be supplemented by further inquiry. They are subject to a moderate range of those influences which have the largest disturbing power, and are therefore well fitted for statistical investigation. Lastly, the results we may obtain are of direct practical interest. The inquiry is a complicated one at the best; it is advantageous not to complicate further by dealing with notabilities whose histories are seldom autobiographical, never complete, and not always very accurate; and who lived under the varied and imperfectly appreciated conditions of European life, in several countries, at numerous periods during different centuries."

On the other hand Mr. Galton labors under some disadvantages in thus limiting his inquiry, and his generalizations cannot be as

[1] Histoire des Sciences et des Savants depuis deux Siecles. Par Alphonse de Candolle. Geneve, 1873.

[2] Hereditary Genius—An Inquiry into its Laws and Consequences. By Francis Galton, F. R. S. D. Appleton & Co. 1870.

wide or as entirely reliable as those of De Candolle. He alludes himself to some of them. "We must not forget[3] that there are deep and obscure movements of national life which may quicken or depress the effective ability of the nation as a whole."

Again, according to his own showing, the present condition of English society is not favorable to the existence and development of pure Science. "It may be remarked,[4] that the national condition most favorable to general efficiency is one of self-confidence and eager belief in the existence of great works capable of accomplishment. The opposite attitude is indifferentism, founded on sheer uncertainty of what is best to do, or on despair of being strong enough to achieve useful results.....A common effect of indifferentism is to dissipate the energy of the nation upon trifles; and this tendency seems to be a crying evil of the present day in our own country."

But the most unfavorable condition of all, as it seems to us, for the development of the true scientific man in England, is barely alluded to: "Educational monopolies,[5] which offer numerous and great prizes for work of other descriptions, have caused enormous waste of scientific ability by inducing those who might have succeeded in science to spend their energies with small effect on uncongenial occupations." The educational monopolies here referred to are readily understood to be the Universities of Oxford and Cambridge, which, in proportion to their immense endowments, do so ridiculously little for science and scientific men. In this respect, they do not compare with the Scotch Universities; and as to any comparison, from a scientific point of view, with the European Universities, it is discreditable to the last degree.

In drawing a comparison between the results obtained by Galton in his inquiry with English men of science, and those of De Candolle in his more extended inquiry, let us not omit one great difference of opinion between the two. It is all-important, because they have discussed their respective results with special reference to these different views. Galton throughout this inquiry maintains the greater force of hereditary influences, as against education and surroundings, in the development of scientific men. De Candolle, on the other hand, has analyzed and classified numerous conditions favorable to the development of science, without considering the antecedents of the scientific men themselves.

However, in a previous article,[6] Galton so qualifies and modifies his definition of what is to be understood by inheritance, that he

[3] p. 170.

[4] p. 171.

[5] p. 167.

[6] Fortnightly Review, March, 1873.

explains on this theory similarities of mental constitution which could be quite as readily attributed to imitation or similarity of surroundings. He justifies the latitude he takes in this definition by alluding to the impurity of the human breed as compared with the breeds of some animals, a point which appears to us to be well taken.

We have a very curious and rather surprising result obtained by considering the rank in life from which the scientific men have come. De Candolle had found, in a study of the lives of European scientific men in the last two centuries, that of the whole number, 41 per cent. were from the aristocratic or wealthy classes, 52 per cent. from the middle class, while only 7 per cent. were from the working classes.

Galton finds that of his list only 8.4 per cent. come from the aristocratic (noblemen and private gentlemen) classes, 88.6 per cent. came from the middle classes, and only 3 per cent. from the working classes. This is certainly a surprising result for England, where the aristocracy are wealthier and better educated than in any European country. It certainly seems to be an excellent commentary upon the appreciation of science by these privileged classes, and upon the state of the higher education in England. We would gladly note other interesting and valuable results obtained in this study by Mr. Galton, but cannot now take the space.

With the materials at his disposal, he has certainly made a very interesting book; but we think that the objections already stated to the limitation of his inquiry to English scientific men are very strong—much stronger than he seems willing to admit. When we consider that his own admissions show England to be in a very peculiar, not to say unfavorable, condition for the production of scientific men, it seems to us that so large a question as that of "nature or nurture" can hardly be settled definitely on such limited data. We hope that in the course of the author's study upon "hereditary genius" he may extend the field of his discussion to at least the limits taken by De Candolle. The book is exceedingly neat and attractive in appearance, and promises well for the new "Popular Science Library."

PICTURES OF LIFE IN CAMP AND FIELD. By Benjamin F. Taylor. 12 mo., pp. 272. Price $1.50. Chicago: S. C. Griggs & Co. 1875.

This book is compiled from fragments of old letters written during the war to the Chicago *Evening Journal*, from the battle fields of the Army of the Cumberland, and as a book which does not aim to exalt any commander nor justify any theories of war, it should have a cheering effect upon those who lose heart in the thought that this money-getting and self-seeking age is lacking in fine and

noble elements of character. Little sketches like these remind us that a few years since the spirit and heroism of Greece and Rome sprang into life at our own hearth stones, and that North and South the men of the nineteenth century were in valor, purity of purpose and patient endurance not unworthy sons of those who gained and established the liberties of our country.

Mr. Taylor writes with enthusiasm and spirit, and some of his pictures have life and vigor, but the strength of his original conceptions is weakened by bad taste and the "deal of skimble-skamble stuff" presented makes one wish for Mr. Taylor a Phocion to prune his periods.

We and Our Neighbors; or The Records of an Unfashionable Street. (Sequel to My Wife and I.) A Novel. By Harriet Beecher Stowe. New York: J. B. Ford & Co.

This book brings us back to the circle of friends we met in My Wife and I, and is superior to the earlier work in its freedom from the extreme vulgarities there portrayed in the characters of "Modern Emancipated Women." These do not intrude upon the home circle, the story of whose daily life gives a charm to the unfashionable street of New York. As a story, it amounts to little; as a work of Mrs. Stowe's, it may, by her earlier admirers, be regretted as a descent, after her marvelous successes, into the common-place. Doubtless much of that success was owing to the fact that Uncle Tom touched in every heart a chord of sympathy for the oppressed, but still a work that reached the signficant honor of being translated even into Asiatic tongues, must have had immense power, if only in that it so universally touched that chord. Intellectual strength and beauty of style are not to be found in this book, but one great merit it has: it is the record of quiet, unobtrusive, every-day lives, that by thoughtfulness make many share in the brightness of a little home in a back street. It shows the beauty and power of little acts of self-sacrifice and love, for which every life has ample opportunity, and which novelists are apt to overlook in straining after great deeds of heroism which can enter into but few lives.

The Mirror of a Mind. A poem by Algernon Sydney Logan. 16 mo., gilt, $1.50, New York: Published for the author by G. P. Putnam's Sons, 1875.

Whatever other divisions may be made of it, poetry is either subjective or objective. Byron, Shelley, Poe, De Musset, are of the former school, poets of the mind and passions, while Wordsworth, Goldsmith and Bryant are of the latter, poets of the affections and of nature. Of course, there are men who combine

both inspirations, and very few who are the pipes exclusively of one; but we consider those named as well-marked examples of two very different schools of poetry, suited to different minds. Men generally, especially young men, incline to subjective poetry because they are strong and capable of violent emotions, and because of its human element, while women, being contemplative and dependent, prefer descriptive, domestic, religious and well-ordered verse. Mr. Logan's poem, as the name indicates, is subjective, and we are glad to say it is subjective poetry of a very high order. The metre he has chosen is the Spenserian stanza of eight heroics followed by an alexandrine, and he has divided the poem into two cantos.

The man who would hold a mirror up to his mind must have some war within to make it worth reflecting. Too often the terrible litanies have been swelled by the strugglings of a spirit against its own crime, degeneracy, doubts or disappointments. Only these have driven it for expression into poetry. So that although we admit drunkenness, disappointment or doubt will not make poets, still we can point out many whose temples would never have felt the bays had they not first felt the throbs of excess of one kind or another. But we hasten to say, lest this introduction amuse or offend some one, that we do not attribute to licentious excesses the excellence of Mr. Logan's verses. On the contrary, if we see the reflection aright, the war within his mind is that it is an ambitious one disappointed with itself, elated with the consciousness of powers that it is depressed at not finding. He does not satisfy himself, and in willful isolation he finds nothing else to satisfy him. What convinces us that he is not, as might be inferred from his verse, the old swan singing his dying song, is that we have never heard any of it before, and it is altogether too good to have been smothered into old age.

The passions he holds up to view are not those of love, or riot, or misanthropy, or blasphemy, but it is the serious temper that has longed for something unattained and is dissatisfied. It sees death and wonders at it; it weighs life and finds it wanting; it looks at man and agrees that he is a worm; it turns in nature, not to daisies and daffodils, but to the immense planets and the distant stars, and the lawless wind, and the mysterious change from day to night and from season to season. These things awe him. They have nothing to do with man, and he forgets himself in their dumb grandeur. If he looks back upon his youth and finds it all wrong, or if he considers his present and finds it unsatisfactory and his future uncertain, he gets no relief, as the pastorals would, in fondling the ears of a calf; but if he goes to nature at all, pours forth his discontent only to the lonely and the vast.

Now in our nervous age this unhealthy temper is too common.

To be probing one's self and examining one's motives, and to allow others to have always and always less share in one's thoughts, is the most dangerous kind of selfishness. But not all morbid men have the redeeming feature of putting their irritabilities into such delightful shape as the author does. His mind, always weighing and weighing, has acquired an accurate habit, and he describes whatever pleases him to the life. We shall let him speak for himself in a few selections, though we assure those who have the opportunity that the best and pleasantest test will be to read the book through.

He will tell you of the utter uncertainty of love, and, on the other hand, of the certainty of a recoil in every exultation, with the air of a man who does not trust himself and has still less confidence in others.

XIII.

Towards love's sun doth bliss, that butterfly,
Soar on his fragile wing, nor knows the day
Which viewed his birth shall see his bright plumes lie
Dim in the dust; a single snow-flake may
Hurl him forever from his joyous way;
A single breath from out the northern heaven
Will quench with stormy clouds the autumnal ray;
And in an instant he is madly driven
Down on some chilly stream, with pinions wrenched and riven.

XIV.

When exultation bursts upon the soul,
Crushing the barriers reared by years and pride;
When the lip curls—eye flashes; when control
Reels backward tott'ring, and the long denied
And boastful tongue pours forth what we would hide;
When to thy fellow man thy heart grows warm,
Grasp thy mind's tiller, trust not to the tide!
Moments of perfect bliss e'er bode us harm—
The gentle sea-gull's coming tells the wildest storm.—*Canto I.*

But he was not always so wise, and he smiles to think how long it took him to find out that happiness is a martlet.

XIX.

But childhood waned, and as I older grew,
My glance was upward, though I knew not why;
Above me Happiness the martlet flew;
I marked her pathway through the stormy sky,
Enraptured with her pinions' gorgeous dye;
And oft she faded from my straining sight,
Oft in her wavering course swept swiftly nigh—
I knew not she was footless, and her flight
Eternal, and I deemed she might, she could alight!—*Canto I.*

Yet he half suspects that this temper is not altogether natural to him, and stops to resent the selfish indifference of those who in his youth took no pains to encourage him, and the petty malice

of those who were glad to tell him that his powers were very ordinary.

XX.

Power, Envy, Hatred, sent their shadowy brood—
  Words, gestures, looks, the half indifferent air,
Oppression unavowed, yet understood,
  Assent equivocal, and praise most rare,
  The hint that all men all your talents share,
    The boundless praise of others your own knoll,
  Like phantom birds with brazen beaks, these tear
    The stoutest heart, and check the boldest soul,
    And with their poisoned wings blot out the distant goal.—*Canto I.*

Of course autumn is the favorite season of such a man, and a very dignified stanza he gives him.

XXIV.

For now sad autumn with his plaintive flute
  Upon the hill-tops mournful ditties plays;
Tears doth he shed which stain his russet suit,
  Weeping the waste which yet he never stays,—
  Save when at times his march he still delays
    And towards the parted summer turns him round,
  With melancholy smile and longing gaze;
    With red and yellow leaves his head is crowned,
    And ever as he walks some rustle to the ground.—*Canto I.*

And here are five lines striking enough to make a sportsman hear his hound.

Dead leaves in heaps lie stiffening all around;
  Mists rise where'er we gaze with motion slow:
While the faint warble of the distant hound
  Lingers upon the air with billowy flow,
  Soft, sweet, yet ominous—unfeeling, though so low.—XVII., *Canto I.*

The spot he seeks out is like this.

XI.

There is a spot where oft my steps are bent,
  Where giant rocks to press the earth are seen
With the deep, heavy, lost abandonment
  Of an eternal slumber; and they lean,
  And seem as nodding o'er the flickering sheen
    Of a slight rill, which hastens on below
  'Twixt mossy stones; while many an evergreen
    Stretches his muffled arms with movements slow,
    As if to stay the stream, and hush its boisterous flow.—*Canto II.*

Why will mighty death condescend to touch a thing like man?

XVIII.

Beholding man, as man around we see,
  We wonder Death will touch so mean a thing—
That they who never saw reality,
  Who o'er pure nature tawdry drapings fling,

Shall e'er behold the universal king,
The sole controller of life's hidden fire—
From the cupped flower, the dimples of the spring,
To systems whom no weight of time can tire
Who yet beneath his frown pale, sicken, faint, expire.—*Canto II.*

These are lyrics of the highest order both in conception and in versification; and the question left on our mind is, whether, if they are received as favorably as we think they deserve to be, we shall have more in a happier strain, or whether like Alexander's soldier, who ceased to fight when his disease was cured, Mr. Logan will give us no more at all.

THE LIFE AND GROWTH OF LANGUAGE. *An Outline of Linguistic Science.* By William D. Whitney. New York: Appleton & Co., 1875. Sixteenth volume of the International Series.

Much of the interest which Professor Whitney's contributions to the literature on language inspire is due to his sober and lucid method of dealing with linguistic problems. The present work, which forms a volume of the International Scientific Series, has the merit of clearness and unmistakable directness in a high degree, and answers probably better than any other book as an introduction to the study of linguistic science. Not as if it were a mere guide-book for beginners. While intelligible and attractive to a large circle of persons of general information, its discussions equally concern the scholar and philosopher. For it so happens that while on the field of comparative philology brilliant and lasting results have rewarded the labor of eminent scholars, the fundamental questions on the nature, origin and growth of language appear to be as much unsettled as when Plato inquired whether words were given to things φύσει or θέσει. Professor Whitney firmly maintains the stand previously taken, that "every word handed down in every human language is an arbitrary and conventional sign: arbitrary, because any one of the thousand other words current among men, or of the tens of thousands which might be fabricated, could have been equally well learned and applied to this particular purpose; conventional, because the reason of the use of this rather than another lies solely in the fact that it is already used in the community to which the speaker belongs."

According to the plan of the work, attention is first directed to the manner in which existing languages are acquired and transmitted, how they act upon the mind, what advantages they supply, what constraints they impose. The larger portion of the book is devoted to the historical aspect of language, its development, the action of conservative and alterative forces upon it; then follows a synopsis of the languages spoken; and the last chap-

ters contain what we might call the philosophy of language, views concerning its nature and origin.

In opposition to the lofty transcendentalism of other writers, Professor Whitney upholds a very plain—as he calls it at another place, iconoclastic—theory on the subject. Language is not identical with thought, nor is it the immediate exertion of the thinking faculty; it is a system of audible signs, originally suggested and mainly used for communication of one human being with others. Its history is analogous to the history of an institution (to which it may be fitly compared), to the history of mechanics and other outcrops of human culture. Language is an acquisition of man not shared by animals, but in this respect only another evidence of his superior powers, as is tool-making. Its origin must be sought in man's desire to signify to others some impression of his own. "Whatever offered itself as the most feasible means of arriving at mutual understanding would be soonest turned to account. We have regarded the reproduction, with intent to signify something, of the natural tones and cries, as the positively earliest speech; but this would so immediately and certainly come to be combined with imitative and onomatopoetic utterances, that the distinction in time between the two is rather theoretical than actual." "Mutual intelligence being aimed at, and audible utterance the means employed, audible sounds will be the matter most readily represented and conveyed."

In further elucidating the view that imitation of sounds furnished many of the earliest elements of speech, Prof. Whitney continues: "The scope of the imitative principle is by no means restricted to the sounds which occur in nature, although these are the most obvious and easiest subjects of significative reproduction. What it is may be seen in part from the range of onomatopoetic words in known languages. There is a figurative use of imitation whereby rapid, slow, abrupt, repetitive motions are capable of being signified by combinations of sounds which make something such an impression on the mind through the ear as the motions in question do through the eye."

Curious misconceptions arise not in this branch of inquiry only from our habit of personifying abstract notions and assigning to them certain qualities, powers, tendencies, etc. This is well enough if understood as an abbreviated form of statement, but not unfrequently the figurative mode of expression misleads and deceives. "There are those still," Prof. W. says, "who hold that words get themselves attributed to things by a kind of mysterious, natural process, in which men have no part; that there are organic forces in speech itself, which, by fermentation, or digestion, or crystallization, or something of the sort, produce new material and alter old." In opposition to such strange notions it becomes necessary to insist on a truism like this: "That a word can be

altered only by passing from mouth to mouth, the reproduction not being exact." The apparent difficulty that no individual has the power of effecting a change in established language, is really not in the way at all, as such changes only become impressed on language, to which the whole speaking community, for some reason or other, is inclining. In this connection Prof. Whitney remarks: "It is not necessary that every single change should start from a single point. There are some towards which the general mind so distinctly inclines, which lie so closely outside of and within reach from the present boundaries of usage that they are made independently by many persons in many places, and thus have a variety of starting-points, from which they strive after currency." How these slight, at the beginning almost unnoticed, variations sum up in course of time is well known. The aggregate of such changes has turned the Anglo-Saxon into English, the Latin into the Romanic languages, the Indo-European into the numerous progeny of languages spoken in Europe and Western Asia.

Throughout the whole book, the sensible plan has been followed of drawing as much as possible upon the English for the purpose of illustration; apart from its being to all readers the most familiar language, there is probably in the range of languages none so well suited to exhibit the normal and abnormal phenomena of speech, the fitful career of words, the regular and adventitious resources of the vocabulary, and the pathology of grammar.

The history of words with regard to their change of meaning, to which one of the chapters is devoted, is a theme of exhaustless interest. It is intimately connected with the history of civilization, and the mental habits of our race. But the direction in which such changes move can be pointed out only in a general way. Professor Whitney's remarks on the subject, though offering nothing new, are well-considered and suggestive.

The sixth chapter speaks of the loss, and the seventh of the acquisition of words and forms. The latter shows how the vocabulary keeps even pace with the growth of knowledge and ideas, though debarred from creating new roots. The readiest expedient is to crowd a new meaning into a word that is sufficiently patient or pliable. Foreign words and compounds furnish another supply. Such compounds are often condensed into seemingly simple words, or they receive a conventional meaning, not implied in the component parts. The author remarks, talking of compounds: "Though in English they are far from being as numerous as in German, our speech is pretty full of them." We venture to say *en passant* that the English would be credited with a much larger number of compounds, were it not for the prevailing custom of separating so many of them into two words, and

calling the former of them, absurdly, an adjective. *Sea water, sewing machine, iron furnace*, and a thousand others, are really compound words.

How dialectic difference must arise within the limits of a single language, how under favoring circumstances, such as segregation or political independence, these differences widen and constitute separate languages, on what ground the languages of the Indo-European stock must be taken as offshoots of one parent speech, forms the subject of the ninth chapter. The seven branches of the Indo-European are briefly treated in the tenth, which also furnishes a constructive theory of the gradual formation and development of language, the Indo-European being taken as type.

With regard to grammatical gender, which forms a problem in the history of language, Prof. Whitney appears to abide by the common impression, that it reflected at the outset the distinction of natural sex. "Its foundation must, of course, lie in the distinction of sex in those creatures which have conspicuous sex." This view, almost forced into us by our grammatical training, nevertheless is beset with hopeless difficulties. The unscrupulous distribution of sexless nouns (including the numerous class of abstracts) over all three genders, is not a license or an abuse that has crept into language; the oldest stages of our speech exhibit this apparent incongruity in fullest extent. All attempts to widen by symbolism the spheres of male and female, so as to make them correspond to the grammatical masculine and feminine, are simply failures. Latin, Greek, Sanscrit, show that terminations or suffixes have more to do with determining the gender of nouns not denoting persons than their meaning has. What is there so radically different in *motus* and *motio* that one should have the gender set apart for males, and the other that for females? Again, it is impossible to believe that nouns had originally, *in statu nascente*, as it were, the distinction of gender attached to them. There could have been no gender prior to the period of suffixes, and it may not have become a conscious feature of language until the agreement of pronouns and adjectives with nouns called it into play. Upon what ground the three classes of nouns, which we now call masculine, feminine and neuter, were instituted, we do not venture to say; but that the dividing lines had any relation to sex appears to be only a time-honored prejudice. Nouns denoting males and females drifted into two of the classes; but being much outnumbered by other words that kept them company, could not have constituted the leading feature of the respective genders.

The 12th chapter takes up the families of languages not of Indo-European stock, describing in brief outline their structure, and calling attention to problems (such as the possible connection

between Semitic and Indo-European languages) that await their solution. The concluding chapters return to questions of a general nature, which have already been alluded to in the beginning of these remarks.

As a matter of course, a volume of not much more than 300 pages cannot do equal justice to the copious material which Prof. Whitney has undertaken to exhibit in a popular form. The work is not so much instructive by detailed information as by inculcating general principles. Upon some of his points the author seems to dwell with almost tiresome explicitness. As his views have of late been severely impugned, he may have thought proper to fortify his position. But all controversy is kept out of sight; neither the sarcastic petulance of Max Müller nor the rudeness of Steinthal has disturbed the calm and entirely objective tone of Prof. Whitney's lucubrations.

BOOKS RECEIVED.

Elena, an Italian Tale. By L. M. Comyn, author of "Atherstone Priory." 16mo., paper, 75 cts. Boston: Estes & Lauriat, 1875.

Stretton, a Novel. By Henry Kingsley. Jettatrice: or, The Veil Withdrawn By Madame Augustus Craven. Uniform Series, 75 cents each. Boston: Estes & Lauriat.

Half-hour Recreations in Natural History. Half-hours with Insects. Insects of the Forest; also, Half-hour Recreations in Popular Science. The Ice Age in Britain, and Causes of the Degeneracy of the Teeth. Boston: Estes & Lauriat.

Aunt Margaret's Trouble. By Miss Dickens. Complete in one volume, 25 cents. T. B. Peterson & Bro., 306 Chestnut St., Philadelphia.

A Summer Parish: Sabbath Discourses and Morning Services of Prayer at the Twin Mountain House, "White Mountains," N. H. By Henry Ward Beecher. Pp. 231, price $1.50. J. B. Ford & Co., Publishers, New York. [J. B. Lippincott.]

The Abbé Tigrane: *Candidate for the Papal Chair.* From the French of Ferdinand Fabre. Translated by Rev. Leonard Woolsey Bacon. 12mo., cloth, pp. 272, price $1.50. J. B. Ford & Co.,, New York. [J. B. Lippincott.]

Queen Mary: a Drama. By Alfred Tennyson. [Author's edition, from advanced sheets.] 16mo., pp. 284, $1.50. J. R. Osgood & Co., Boston. [Porter & Coates.]

The Character and Logical Methods of Political Economy. By J. E. Cairns, LL.D. 12mo., cloth, $1.50. New York: Harper & Bro. [J. B. Lippincott.]

Afraja: or Life and Love in Norway. From the German of Theodore Mügge. By Edward Joy Morris, late U. S. Minister to Turkey. (International Series.) Philadelphia: Messrs. Porter & Coates.

The Better Self: Essays for Home-life. By J. Hain Friswell, Author of "The Gentle Life." Crn. 8vo., cloth, pp. 300, price $1.75. Philadelphia: Porter & Coates.

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